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Chemical analysis of 659 coal samples from the eastern United States

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Abstract

This report includes the analytical data on 659 coal samples from 8 States east of the Mississippi River. The number of samples from each State are: Pennsylvania, 132; Ohio, 101; Maryland, 25; West Virginia, 254; Virginia, 83; Indiana, 49; Massachusetts, 5; and Rhode Island, 10. The analytic data are filed in the National Coal Resource Data System of the U.S. Geological Survey.

The U.S. Geological Survey has quantitatively determined 35 major, minor, and trace elements in each sample. Tests were also made for 35 other trace elements using semi-quantitative spectrographic methods. In addition, the Coal Analysis Section of the U.S. Department of Energy has determined proximate and ultimate analyses, Btu, forms of sulfur, free-swelling indexes, and ash-fusion temperatures on 563 of the 659 samples.

Comparison of the geometric means of the 644 bituminous coal samples of this report with an additional 968 bituminous coal samples of the eastern United States reported by Swanson and others in 1976 and by Zubovic and others in 1979 is shown in tables 2a-c. As shown by the means for ultimate and proximate analyses, small differences exist between the two sets of data; however, only the moisture and oxygen contents are significantly different. The forms of sulfur, ash-fusion temperature and heat of combustion are similar. The means for the major and minor oxides in ash are similar for SiO_2, K_2O, Fe_2O_3, TiO_2, MgO, and P_2O_5 are lower, whereas, MnO is higher in the analyses of the samples of this report. Eighteen of the means for the trace elements in the coal are about equal for the two sets of samples. Only As, Co, La, Li, and Pb are significantly higher, whereas, Ag, B, Ba, Be, Cd, Cs, F, Ge, Mo, Nb, and Nd are lower in the 644 bituminous coal samples of this report.

Introduction

Current usage and projected increases in the mining and utilization of coal have resulted in increasing numbers of requests from industry, university, and government groups for detailed high-quality data on the composition of coal in the United States. Such data are fundamental in determining the initial economic value of coal, in evaluating environmental effects and coal use on the land, water and air, and in determining the adaptability of the coal to beneficiation (cleaning), combustion, gasification, liquefaction, and other technologic processes of coal treatment.

For 8 years, the U.S. Geological Survey, in cooperation with State geological surveys has had a systematic coal geochemistry program to collect representative samples from the hundreds of beds of coal (lignite, subbituminous, bituminous, and anthracite) from which coal is being produced, or will be produced in the United States. Beginning with the collection and analysis of 71 coal samples and 16 power-plant ash samples for the U.S. Department of the Interior's Southwest Energy Study in 1971, the program has steadily expanded and as of January, 1980, more than 6,000 samples have been analyzed by the U.S. Geological Survey. Most of the analyses have been made publicly available in the following reports: Swanson, 1972; U.S. Geological Survey and Montana Bureau of Mines and Geology, 1973, 1974, 1976; Swanson, Huffman, and Hamilton, 1974; U.S. Bureau of Land Management, 1975a, b, c; Swanson and others, 1976; Zubovic and others, 1979.

A series of reports have been published by the U.S. Geological Survey on samples from coal beds from selected areas of the western United States. These are: Culbertson and others, 1978; Hatch and others, 1978; Hatch and Affolter, 1978; Affolter, Hatch and Culbertson, 1979; Affolter, Hatch, Matson and Sauer, 1979; Affolter, Hatch and Ryer, 1979; Affolter, Hatch, and McKay, 1979; Affolter and Hatch, 1979; Hatch and Affolter, 1979; Hatch and Barclay, 1979; Hatch, Affolter and Law, 1979; Hatch, Madden and Affolter, 1979; Hildebrand and Hatch, 1979; Hildebrand, Hatch and Henry, 1979; Schneider, Hildebrand and Affolter, 1979. Additional data have been reported by State geological surveys: Glass [Wyoming], 1975; Conwell [Alaska], 1976; Williamson [Mississippi], 1976; Skema and others [Pennsylvania], 1977; Botoman and Stith, [Ohio], 1978.

On April 30, 1975, the coal geochemistry program was expanded by the infusion of funds provided by the U.S. Energy Research and Development Administration. Coincident with this expansion, the geological surveys of the coal-bearing States were invited to cooperate in the program by submitting samples for analysis. As a result, the program gradually was enlarged to accomodate the collection and analysis of about 1,500 samples per year.

When the Energy Research and Development Administration was incorporated into the U.S. Department of Energy, funding for the program from that agency was curtailed and later was dropped. The U.S. Environmental Protection Agency provided funds for fiscal year 1978. This funding provided for the collection and analysis of 650 coal samples per year from areas east of the Mississippi River. For sampling and analyzing coal beds west of the Mississippi River, funding has been provided by other programs in the U.S. Geological Survey and by other agencies. This report provides the data on 659 coal samples in fulfillment of the U.S. Geological Survey, Environmental Protection Agency agreement.

Acknowledgments

The work that resulted in this report involved the direct and close cooperation of four groups--the U.S. Geological Survey, the State geological surveys of Pennsylvania, Ohio, Maryland, West Virginia, Virginia, Indiana, Massachusetts and Rhode Island, the U.S. Department of Energy, and the U.S. Environmental Protection Agency. Many individuals in each group contributed materially to the program, and each individual is herein recognized and given credit for the accomplishment of objectives attained to date.

The U.S. Geological Survey initiated the program, coordinated the effort, conducted the analytical study, and is primarily responsible for reporting the results. Vernon E. Swanson, Gordon H. Wood, Jr., and Jack H. Medlin conceived the program and were mainly responsible for bringing the study to its present state. Joseph R. Hatch and S. Lynn Coleman carried much of the day-to-day load of sample processing and data compilation, assisted by Arthur R. Norton, Thomas E. Carter, Ricky T. Hildebrand, Scott D. Woodruff, Antoinette L. Medlin, and Josephine G. Boerngen. John E. Johnston and Val Zadnick provided much of the direction in obtaining the assistance of the State geological surveys in collecting samples.

Fundamental to the success of the analytical program, on the samples of this report, is the team of chemical laboratory personnel in the U.S. Geological Survey, Reston, Virginia, under the direction of Brent P. Fabbi, Irving May, Harry J. Rose, Jr., Jack J. Rowe, Frederick O. Simon and Charles S. Annell. The chemical laboratory personnel are Philip J. Aruscavage, Philip A. Baedecker, Sol Berman, Floyd W. Brown, Joseph W.

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Methods of sample collection and analysis

Since the inception of the program, the U.S. Geological Survey has issued a set of guidelines on collecting coal samples and a summary of the chemical methods used in analyzing the samples is available in the U.S. Geological Survey Circular 735 (Swanson and Huffman, 1976). Samples of fragmented coal weighing about 2 kg (4-5 lb) are placed in plastic bags for transportation and storage to minimize moisture loss and possible chemical contamination, particularly trace-metal contamination by cloth bags or metal containers. The sequence of sample preparation and the methods of chemical analysis routinely used on samples are shown in figure 1.

All completed coal chemical analyses, including both U.S. Bureau of Mines and U.S. Geological Survey analyses, are stored in the U.S. Geological Survey's National Coal Resources Data System. The stored data can be rapidly retrieved and statistically manipulated for local, regional, or National summation, correlation, and map-display purposes.

Discussion of the samples

The coal samples collected for analyses, listed in this report, are from the Appalachian and Eastern Interior Regions and are of bituminous rank, except for the 15 anthracite samples from Massachusetts and Rhode Island. A generalized computer drawn map of the distribution of the samples is shown as figure 2 and a computer drawn map showing the distribution of samples in each State is included with the State discussions. The number of coal samples from each State on which analyses were made is listed in table 1.

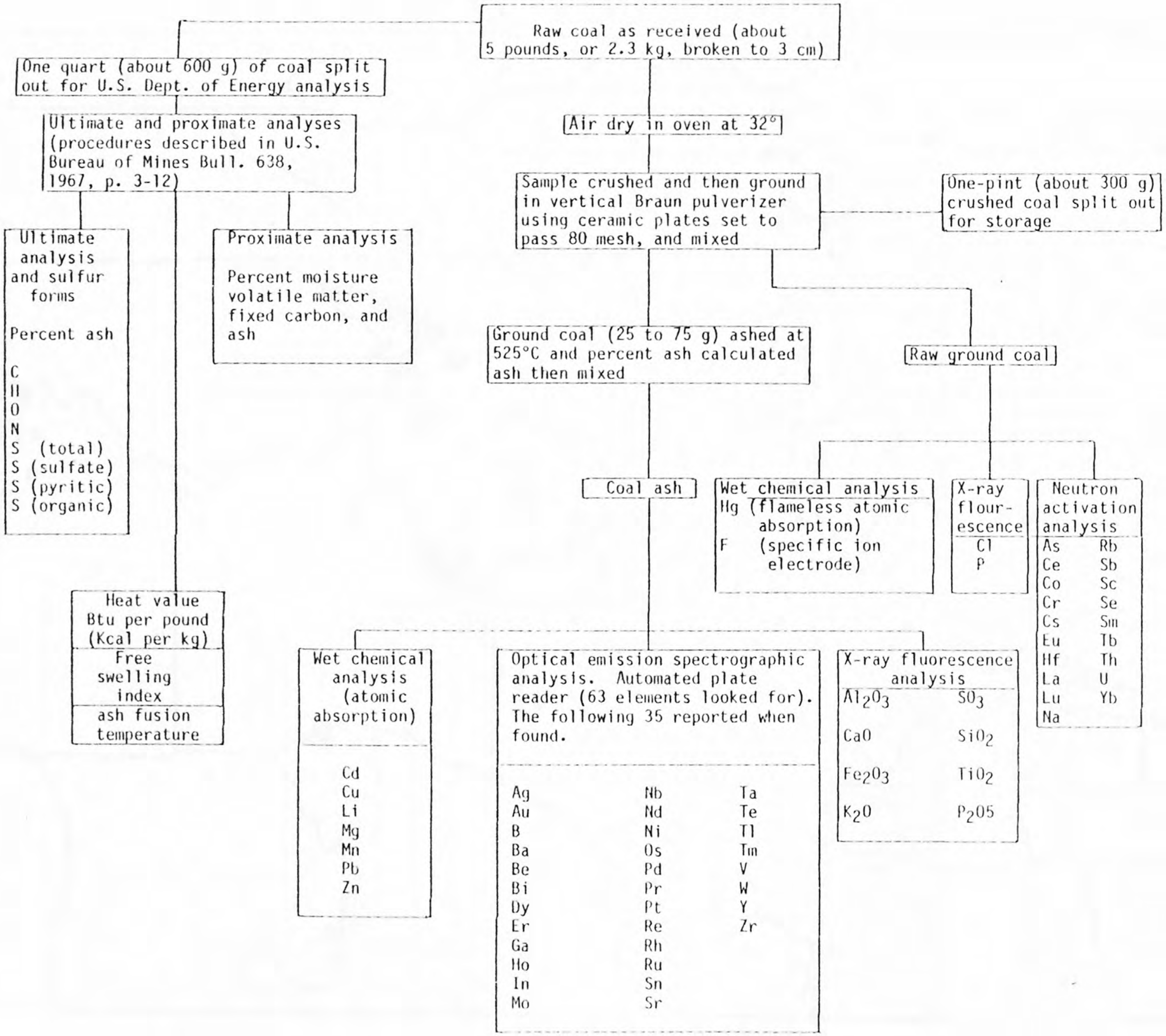

Figure 1 -- Analyses performed on the coal samples.

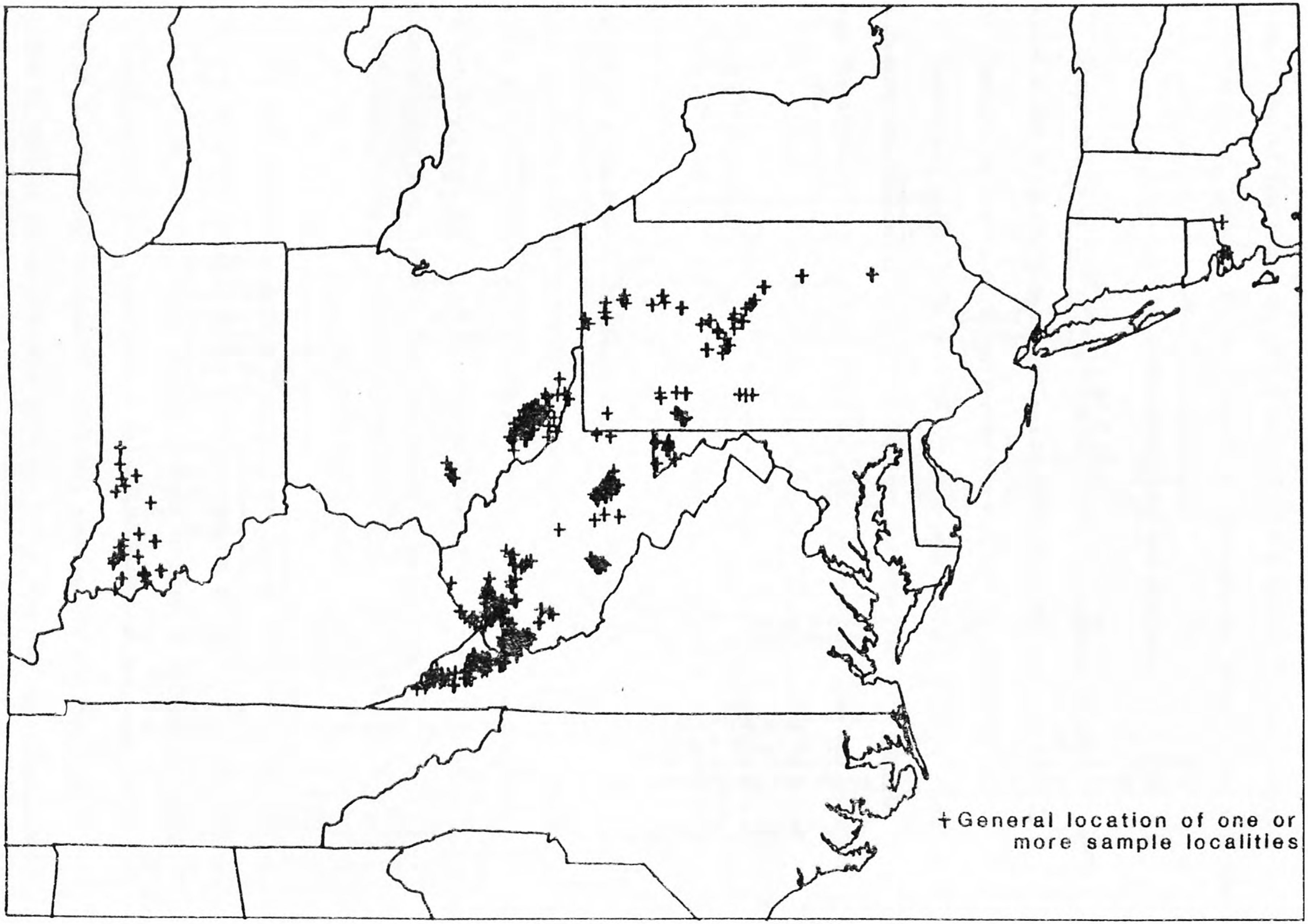

Figure 2.--Distribution of coal samples in the eastern United States.

Table 1.--Distribution and number of samples by State

Area	Number of samples analyzed: U.S. Geological Survey	Number of samples analyzed: U.S. Dept. of Energy
Eastern Province		
Rhode Island Meta-anthracite Region		
Massachusetts	5	5
Rhode Island	10	10
Appalachian Region		
Pennsylvania	132	132
Ohio	101	99
Maryland	25	12
West Virginia	254	232
Virginia	83	63
Interior Province		
Eastern Region		
Indiana	49	10
Total	659	563

Table 1 also shows that for some States fewer U.S. Department of Energy analyses are reported than U.S. Geological Survey analyses. The reasons for this discrepancy are: (1) in some cases the samples submitted were too small for all of the analyses to be made, (2) several States submit samples for DOE analysis directly to the agency and these data have not yet been received by the U.S. Geological Survey, and (3) several shipments of samples to the DOE labs have been lost in the mails and replacement samples were not submitted in time for this report.

The names of some coal beds are not known locally and are not listed because of correlation problems within basins. Because of this problem, such coal bed names are designated as "no data entered" in the tables. It is likely that State geological surveys will supply the required correlations in the near future.

Explanation of statistical methods and terms used in summary tables

In this report the geometric mean (GM) is used as the estimate of the most probable concentration (mode); the geometric mean is the antilog of the logarithms of concentrations. The measure of scatter about the mode used here is the geometric deviation (GD), which is the antilog of the standard deviation of the logarithms of concentration. These statistics are used because of the common tendency for the amounts of trace elements in natural materials to exhibit positively skewed frequency distributions; these distributions are normalized by analyzing and summarizing trace element data on a logarithmic basic.

If the frequency distributions are, in fact, lognormal, the geometric mean is the best estimate of the mode, and the estimated range of the central two-thirds of the observed distribution has a lower limit equal to GM/GD and an upper limit equal to GM•GD. The estimated range of the central 95 percent of the observed distribution has a lower limit equal to $GM/(GD)^2$ and an upper limit equal to $GM\cdot(GD)^2$ (Connor and others, 1976).

A common problem in statistical summaries of trace element data arises when the element concentration in one or more of the samples lies below the limit of analytical detection, resulting in a censored distribution. Procedures developed by Cohen (1959) were used here to compute unbiased estimates of the geometric mean, geometric deviation, and arithmetic mean where the concentration data are censored. Throughout this report when statistical data are compared on groups of coal samples statements are made that the geometric means for elements are (1) similar, (2) higher or lower, (3) significantly higher or significantly lower in one of the groups. When the geometric means vary by less than 10 percent the values are considered to be similar, variations of 10 to about 50 percent are considered to be higher or lower, variations over 50 percent are stated as being significantly higher or significantly lower.

Explanation of data presentation

The data in this report are arranged in the following format:

1. Comparison of the statistical data on the 644 bituminous coal samples of this report with that of the 968 bituminous coal samples from the eastern United States reported by Zubovic and others (1979) and by Swanson and others (1976).
2. Comparison of the means of the analytical data for coal from each State.

3. Tables containing the statistical summaries and the analytical data on each sample by State. These include the following tables for each State:

Tables 5a-11a, Statistical tables on the Bureau of Mines analyses;

Tables 5b-11b, Statistical tables on the major and minor oxides in coal ash;

Tables 5c-11c, Statistical tables for 38 trace elements in coal;

Tables 5d-11d, Location and description of the coal samples;

Tables 5e-11e, U.S. Bureau of Mines type analytical data;

Tables 5f-11f, U.S. Geological Survey analyses for major and minor oxides in ash;

Tables 5g-11g, U.S. Geological Survey analyses for 22 trace elements in the whole-coal;

Tables 5h-11h, All trace elements reported on a whole-coal basis.

The geographic locality of each sample is given as to State, county, and latitude and longitude coordinates.

Comparison of the coal samples of this report with those reported by Zubovic and others (1979), Swanson and others (1976)

The coals analyzed for this report are of bituminous rank except for the 15 anthracite samples from Massachusetts and Rhode Island. These bituminous coals are compared with the 968 bituminous coals analyzed for the Appalachian Region and Eastern Interior and reported by Zubovic and others (1979) and Swanson and others (1976). Statistical data for the combined samples from Zubovic and Swanson were recalculated for these comparisons. Five hundred sixty-three of the 659 coal samples of this report were analyzed for the U.S. Bureau of Mines type analysis by the

U.S. Department of Energy. Differences in the mean ash contents between (a) and (b) sub-tables in tables 3 to 11 resulted from the differences in ashing temperatures used by the U.S. Department of Energy (750°C) and the U.S. Geological Survey (525°C).

Comparison of the geometric means of the proximate and ultimate analyses of the 548 bituminous coal samples of this report (table 2a), with the 850 samples reported by Zubovic and others (1979) and Swanson and others (1976), shows small differences for most of the analyzed components. Only the moisture content and oxygen have greater than 15 percent differences. Most of the differences are caused by the inclusion of a larger number of lower rank coal samples from Indiana in computing the means for the samples of the report by Zubovic and others (1979). In addition to the similarity of the proximate and ultimate analysis, the heat of combustion and forms of sulfur are not significantly different.

Comparison of the geometric means for the major and minor oxides in the ash (table 2b) with those reported by Zubovic and othrs (1979) and Swanson and others (1976) shows relatively small or no differences for these oxides in the two sets of data.

Comparison of the geometric means for the trace elements in the bituminous coal of this report with those reported by Zubovic and others (1979) and Swanson and others (1976), (table 2c), shows similar mean values for 13 of the elements. Sixteen elements (Ag, Ce, Co, Eu, Ge, Hf, Hg, La, Lu, Nb, Nd, Sb, Sm, Tb, U, and Yb.) have mean values that are higher by more than 10 percent in the coal samples of this report, whereas, 9 elements (B, Ba, Be, Cd, F, Mn, V, Y and Zr) are lower by more than 10 percent. A more than two-fold difference occurs for Sb and Nd.

Table 2a.-- Arithmetic mean, observed range, geometric mean, and geometric deviation of proximate and ultimate analyses, heat of combustion, forms of sulfur, ash-fusion temperatures and free-swelling index of 548 eastern U.S. bituminous coal samples.

[All values are in percent except Btu/lb, ash-fusion temperatures, and free-swelling index and are reported on the as-received basis. °F = 9/5°C + 32; Kcal/kg = 0.556 (Btu/lb).]

	Arithmetic mean	Observed range		Geometric mean	Geometric deviation	Geometric mean 850 samples (from Swanson & others, 1976 and Zubovic & others, 1979)
		Minimum	Maximum			
Proximate and ultimate analyses						
Moisture	3.0	.5	32	2.5	1.7	3.0
Volatile matter	29.4	8.6	44.6	28.1	1.4	31.9
Fixed carbon	55.9	22.1	79.0	54.7	1.2	52.1
Ash	11.7	1.7	47.6	9.7	1.9	9.3
Hydrogen	4.9	2.8	6.0	4.9	1.1	5.1
Carbon	72.4	39.1	86.4	71.8	1.1	70.4
Nitrogen	1.3	.6	1.8	1.3	1.2	1.2
Oxygen	7.7	2.5	40	7.1	1.5	8.8
Sulfur	2.0	.4	10	1.4	2.2	1.6
Heat of combustion						
Btu/lb	12850	2140	15110	12730	1.2	12560
Forms of sulfur						
Sulfate	.07	.01	.67	.04	3.6	.07
Pyritic	1.2	.01	9.0	.62	5.0	.71
Organic	.74	.06	4.4	.76	1.7	.79
Ash-fusion temperature °C						
Initial deformation	1270	1030	1600	1260	1.1	1240
Softening temperature	1310	1050	1600	1300	1.1	1270
Fluid temperature	1360	1090	1600	1360	1.1	1370
Free-swelling Index	6.3	.5	9.0	5.6	1.9	4.5

Table 2b.--Arithmetic mean, observed range, geometric mean, and geometric deviation of ash content and contents of eleven major and minor oxides in the laboratory ash of 644 eastern United States bituminous coal samples.

[All samples were ashed at 525°C; all data except geometric deviation are in percent; L means less than the value shown.]

Oxide	Arithmetic mean	Observed range		Geometric mean	Geometric deviation	Geometric mean 968 samples (from Swanson & others, 1976 and Zubovic & others, 1979)
		Minimum	Maximum			
(Ash)	11.9	1.7	45.9	9.76	1.9	9.96
SiO_2	44	9.5	78	43	1.3	41
Al_2O_3	25	4.9	42	24	1.4	23
CaO	2.1	.16	20	1.4	2.3	1.2
MgO	.79	.08	3.0	.68	1.8	.76
Na_2O	.46	.05L	2.4	.34	2.1	.38
K_2O	1.9	.06	5.4	1.6	2.0	1.6
Fe_2O_3	17	1.1	81	11	2.5	12
MnO	.03	.002	1.42	.02	2.3	.02
TiO_2	1.3	.12	4.1	1.1	1.5	1.1
P_2O_5	.33	.01	17	.13	3.3	.03
SO_3	2.4	.07	16	1.7	2.4	1.7

Table 2c.--Arithmetic mean, observed range, geometric mean, and geometric deviation of 38 elements in 644 United States bituminous coal samples.

[All data are in parts-per-million and are reported on a whole-coal basis; L means less than value shown.]

Element	Arithmetic mean	Observed range		Geometric mean	Geometric deviation	Geometric mean 968 samples (from Swanson & others, 1976, and Zubovic & others, 1979)
		Minimum	Maximum			
Ag	0.05	0.005	0.48	0.03	2.9	0.02
As	18	1.0L	170	8.4	3.6	8.0
B	24	.56L	160	14	2.9	22
Ba	68	4.3	570	48	2.3	57
Be	2.3	.22	14	1.9	1.8	2.2
Cd	.14	.004L	9.0	.07	2.5	.094
Ce	20	.44	110	16	1.9	12
Co	7.9	.8	90	6.2	2.0	5.2
Cr	17	2.3	84	14	1.9	14
Cs	1.1	.1L	8.0	.66	2.9	.64
Cu	18	2.7	160	15	1.8	14
Eu	.39	.08L	3.1	.33	1.7	.24
F	94	13L	1900	51	2.7	57
Ga	5.8	.71	35	4.8	1.9	5.2
Ge	3.9	.07L	36	1.1	6.8	.83
Hf	.80	.1L	4.0	.61	2.1	.42
Hg	.23	.01	1.8	.12	3.6	.10
La	11	1.0L	58	8.8	2.0	6.8
Li	23	1.1	370	15	2.5	14
Lu	.17	.1L	.8	.15	1.6	.12
Mn	27	.96	1400	14	2.9	16
Mo	2.4	.13L	16	1.5	2.6	1.6
Nb	2.0	.09L	18	1.4	2.4	1.1
Nd	9.8	1.0L	60	4.2	3.7	1.9
Ni	16	1.4	130	12	2.0	12
Pb	9.8	.99L	62	7.0	2.2	6.8
Sb	1.0	.1L	7.4	.73	2.3	.17
Sc	4.0	.6	27	3.3	1.8	3.1
Se	3.8	.6L	20	2.8	2.1	2.9
Sm	1.9	.4	14	1.6	1.8	.94
Sr	90	3.9	920	65	2.2	62
Tb	.32	.1L	2.0	.26	1.8	.20
U	1.8	.1L	15	1.3	2.3	1.1
V	20	1.8	120	16	2.0	18
Y	7.6	1.1L	41	6.2	1.9	7.5
Yb	.98	.2L	4.8	.84	1.7	.74
Zn	25	1.3	1600	14	2.7	13
Zr	19	1.4	170	13	2.3	22

Table 3.-- Average content of 32 elements in shale and in the earth's crust, to be used for comparison with the contents of these elements in coal listed in other tables in this report.

	Shale, average (Turekian and Wedepohl, 1961)	Earth's crust, average (Taylor, 1964)
Ag	.07 ppm	.07 ppm
As	13 ppm	1.8 ppm
B	100 ppm	10 ppm
Ba	580 ppm	425 ppm
Be	3 ppm	2.8 ppm
Cd	.3 ppm	.2 ppm
Ce	59 ppm	60 ppm
Co	19 ppm	25 ppm
Cr	90 ppm	100 ppm
Cu	45 ppm	55 ppm
F	740 ppm	625 ppm
Ga	19 ppm	15 ppm
Ge	1.6 ppm	1.5 ppm
Hg	.4 ppm	.08 ppm
La	92 ppm	30 ppm
Li	66 ppm	20 ppm
Mn	850 ppm	950 ppm
Mo	2.6 ppm	1.5 ppm
Nb	11 ppm	20 ppm
Nd	24 ppm	28 ppm
Ni	68 ppm	75 ppm
Pb	20 ppm	12.5 ppm
Sb	1.5 ppm	.2 ppm
Sc	13 ppm	22 ppm
Se	.6 ppm	.05 ppm
Sr	300 ppm	375 ppm
U	3.7 ppm	2.7 ppm
V	130 ppm	135 ppm
Y	26 ppm	33 ppm
Yb	2.6 ppm	3.0 ppm
Zn	95 ppm	70 ppm
Zr	160 ppm	165 ppm

Comparison of the geometric means of the trace elements with their average content in shale, (table 3), reported by Turekian and Wedepohl (1961) shows only Se is found in larger average amounts in these coals. Beryllium, Ge, and Mo are found in comparable amounts. All of the other elements are found in significantly higher amounts in shale. Lithium, Zn, B, Cr, Nb, Ni, and V are at least 5 times higher in shale and F, Ba, Mn, La and Zr at least 10 times higher.

Comparison of the means for the trace elements in coal with their average content in the Earth's crust, (table 3, Taylor 1964), shows that As, Sb, and Se are found in much larger quantities in the coal. This is particularly true for Se which is enriched almost 60-fold in coal. This is comparable to the sulfur enrichment in coal relative to the Earth's crust.

Several elements B, Be, Ge, Hg, Li, Mo and Pb are found in about equal amounts in coal and the Earth's crust or are lower by no more than 50 percent in coal compared to the earth's crust. All the other elements are more than two-fold higher in the Earth's crust.

The elements, which are found in about equal amounts in coal and the Earth's crust or in higher amounts in coal, fall into two categories: those which are chalcophyllic in character and can be expected to follow sulfur in the geochemical cycle such as As, Pb, Sb, Se, and Hg and those which can form stable organic complexes such as B, Be, Ge, and Mo. Zubovic (1966) and Gluskoter and others (1977) reported that these elements have high organic affinities in coal.

Comparison of the geometric means for the coal samples by States

Because the geometric means were calculated from analytic data determined on an "as-received basis" rather than from data on a "moisture and ash-free basis", it is difficult to compare the average rank of coal from one State with that of another (table 4a). However, examination of the means for moisture, ash, volatile matter, and fixed carbon suggests that Ohio and Indiana coal is lower in rank among the bituminous coal than those from the other States. The anthracite samples from Massachusetts and Rhode Island have the highest rank. The highest average sulfur contents are found in Ohio and Indiana coal followed by Maryland, Pennsylvania and West Virginia coal with successively lower sulfur contents. The lowest average sulfur contents are found in the Virginia bituminous coal and the anthracite from Massachusetts and Rhode Island.

The Maryland, Massachusetts, and Rhode Island coal has the highest average ash-fusion temperatures, whereas, the Ohio and Indiana coal has the lowest. Free-swelling indexes were similarily distributed; the highest is for Maryland and Virginia coal, the lowest for Ohio and Indiana coal.

Comparison of the geometric means for major and minor element oxides in the coal ash, (table 4b), shows that the highest values for SiO_2, CaO, K_2O, MnO, and lowest for Al_2O_3, Fe_2O_3, TiO_2, P_2O_5 and SO_3 are found in the anthracite of Massachusetts and Rhode Island. For bituminous coal, most of the highest geometric means for the oxides are in ash of coal from West Virginia and Virginia. The highest values for Fe_2O_3 are from Ohio and Indiana coal which also contain the highest geometric mean for pyritic sulfur (table 4a). The lowest mean values for SiO_2, Al_2O_3, CaO, K_2O, TiO_2 and SO_3 are found in ash from Indiana coals. The SO_3 values in the coal ash do not reflect the amounts of sulfur present in coal. The retention of SO_3 in ash is dependent upon the CaO and MgO content of the ash. Thus, Indiana coal has low values for CaO and MgO.

Table 4a.--Comparison of geometric means for proximate and ultimate analyses, heat of combustion, forms of sulfur, ash-fusion temperatures and free-swelling indexes for all the samples and samples from each State.

[All values are in percent except Btu/lb, ash-fusion temperatures and free-swelling indexes].

	All samples	Pennsylvania	Ohio	Maryland	West Virginia	Virginia	Indiana	Massachusetts Rhode Island
Proximate and ultimate analysis								
Moisture	2.5	1.9	2.7	1.5	2.8	2.5	3.8	2.1
Volatile matter	28.1	24.9	37.3	20.5	26.8	28.3	36.9	3.81
Fixed carbon	54.7	58.5	42.3	58.6	58.4	57.3	44.1	70.6
Ash	9.7	10.7	14.8	15.4	7.64	8.65	11.9	21.4
Hydrogen	4.9	4.7	5.0	4.4	4.9	4.9	4.9	.66
Carbon	71.8	72.4	63.7	67.7	74.9	74.9	63.5	71.4
Nitrogen	1.3	1.2	1.2	1.2	1.3	1.3	1.3	.24
Oxygen	7.1	6.1	8.6	5.1	7.3	6.6	11	4.8
Sulfur	1.4	1.7	3.6	2.0	.97	.88	3.6	.76
Heat of combustion								
Btu/lb	12730	12630	11620	11920	13250	13300	11470	10340
Forms of sulfur								
Sulfate	.04	.07	.05	.03	.02	.02	.02	-
Pyritic	.62	.52	2.1	1.3	.20	.22	2.2	-
Organic	.76	.72	1.2	.50	.52	.59	1.1	-
Ash-fusion temperatures °C								
Initial determination	1260	1220	1170	1340	1320	1300	1180	1320
Softening temperature	1300	1260	1210	1400	1360	1340	1240	1390
Fluid temperature	1360	1290	1440	1450	1390	1300	1300	1530
Free-swelling index	5.6	5.3	4.1	7.8	6.2	7.4	3.4	-

Table 4b.--Comparison of geometric means of ash and major and minor oxides in ash of all bituminous coal samples and samples from each State.

[All samples ashed at 525°C; all data are in percent.]

Oxides	All samples	Pennsylvania	Ohio	Maryland	West Virginia	Virginia	Indiana	Massachusetts Rhode Island
Ash	9.76	11.3	14.6	15.3	7.82	9.34	8.55	20.9
SiO_2	43	40	40	45	46	45	38	65
Al_2O_3	24	24	20	23	26	23	19	12
CaO	1.4	1.1	1.6	1.1	1.4	1.9	.94	5.0
MgO	.68	.48	.58	.68	.77	1.1	.53	2.1
Na_2O	.34	.20	.35	.21	.48	.47	.19	.33
K_2O	1.6	1.2	1.5	1.8	1.7	2.3	1.4	2.5
Fe_2O_3	11	13	23	14	7.8	8.4	22	5.9
MnO	.02	.02	.03	.01	.02	.03	.02	.19
TiO_2	1.1	1.1	.95	1.3	1.3	1.2	.92	.38
P_2O_5	.13	.26	.13	.23	.11	.09	.11	.06
SO_3	1.7	1.4	1.8	1.5	1.8	2.3	1.4	.45

Comparison of the geometric means for the trace elements in bituminous coal, (table 4c), shows that Maryland coal has the highest contents for 20 of the 38 listed elements. Equally high values for Ag, C, Li, Se and V are also found in other States. Pennsylvania and Indiana coal contains the highest average means for 8 elements; Ohio and Virginia have 5 such values. None are found in West Virginia coal. The largest number of low geometric means (15) are found in Indiana coal. Virginia coal has 14 of the lowest means, West Virginia has 7, Pennsylvania, Ohio, and Maryland have 3 for each State.

Comparison of the Massachussetts and Rhode Island anthracite with bituminous coal, (table 4c), shows 7 elements (Ba, Cs, F, Mn, Nd, Sr, and Zr) with higher geometric means in anthracite. Anthracite has the lowest geometric means for 15 elements. Included in this latter group are such elements as Be, Co, Cu, Hg, Mo, and V which are considered to be of some environmental concern. It is interesting to note that lithophilic elements are generally higher and chalcophilic elements are generally lower in anthracite than they are in bituminous coal.

Table 4c.--Geometric means for 38 trace elements in all bituminous coal samples and samples from each State.

[All data are parts-per-million in coal; leaders (--) indicate insufficient data].

Element	All samples	Pennsylvania	Ohio	Maryland	West Virginia	Virginia	Indiana	Massachusetts Rhode Island
Ag	0.03	0.05	0.03	0.06	0.03	0.02	0.06	
As	8.4	11	13	15	5.7	7.9	12	7.0
B	14	10	50	7.0	12	8.1	34	10
Ba	48	41	48	43	54	77	19	110
Be	1.9	2.2	2.0	1.6	1.8	1.6	2.6	.86
Cd	.07	.08	.10	.11	.06	.05	.20	.08
Ce	16	18	16	27	16	16	11	9.8
Co	6.2	6.6	4.8	9.2	6.2	5.9	8.2	3.1
Cr	14	17	18	28	12	12	12	12
Cs	.66	.60	.88	1.5	.53	.90	.64	1.8
Cu	15	14	12	18	15	18	16	5.5
Eu	.33	.40	.34	.54	.31	.30	.25	.20
F	51	32	75	66	56	74	51	140
Ga	4.8	7.0	5.3	7.7	4.1	3.4	4.7	3.1
Ge	1.1	2.0	3.2	2.2	.51	.34	11	--
Hf	.61	.66	.70	1.2	.56	.61	.43	.55
Hg	.12	.19	.18	.43	.08	.09	.09	.02
La	8.8	9.7	8.6	14	8.7	8.6	5.8	5.1
Li	15	20	22	22	12	13	8.3	12
Lu	.15	.17	.16	.20	.14	.13	.12	.11
Mn	14	13	28	11	10	19	14	300
Mo	1.5	2.5	2.4	2.4	1.1	.96	2.1	.55
Nb	1.4	2.0	1.8	1.9	1.1	1.1	1.2	1.2
Nd	4.2	6.1	5.6	2.6	5.1	3.9	3.1	--
Ni	12	16	11	14	11	8.5	25	8.9
Pb	7.0	9.9	6.3	9.6	6.0	5.1	13	7.1
Sb	.73	.85	.56	.69	.68	.71	1.3	1.0
Sc	3.3	4.2	3.7	6.0	2.9	2.9	2.9	2.5
Se	2.8	3.5	3.5	3.5	2.6	2.2	2.5	--
Sm	1.6	1.9	1.6	3.6	1.6	1.5	1.2	.89
Sr	65	83	66	64	65	84	22	88
Tb	.26	.29	.26	.41	.25	.23	.21	.12
U	1.3	.82	1.2	1.7	1.5	1.8	1.6	.47
V	16	20	18	21	14	13	14	15
Y	6.2	8.4	7.3	5.2	5.7	5.2	4.2	4.3
Yb	.83	.98	.98	1.2	.76	.76	.68	.52
Zn	14	17	24	31	9.0	9.8	36	24
Zr	13	19	18	15	11	11	11	2.1

Summary of analytical data on 132 Pennsylvania bituminous coal samples

Analytical data on 97 bituminous and 57 anthracite samples from Pennsylvania were reported by Swanson and others (1976). Zubovic and others (1979) reported data on 71 bituminous coal samples from the same State. Skema and others (1977) reported analytical and geologic data on 124 bituminous coal samples from Pennsylvania. The 132 samples in this report were collected from 22 coal beds. The largest number (18 samples) are from the Waynesburg coal bed. The generalized distribution of the samples is shown on figure 3. The statistical comparisons of the 132 coal samples with the 644 bituminous coal samples of this report are made in tables 5a,b, and c; the analytical data are reported in tables 5e, f, g, and h. Descriptions and specific location of the samples are reported in table 5d.

The following three paragraphs compare the geometric means of Pennsylvania coal samples with the means for all bituminous coal of this report.

Comparison of the geometric means for the proximate and ultimate analyses, (table 5a), shows that several components (ash, H, C, N, and O) do not differ significantly in the two sets of data. The mean sulfur content is somewhat higher and moisture content is lower in Pennsylvania coal. The higher fixed carbon and lower volatile matter, as well as the relation of the ash and moisture, suggests that the average rank of Pennsylvania coal is slightly higher than that of all the coal samples. The other properties (Btu/lb, forms of sulfur, ash-fusion temperatures and free-swelling index) are not significantly different in the two sets of data.

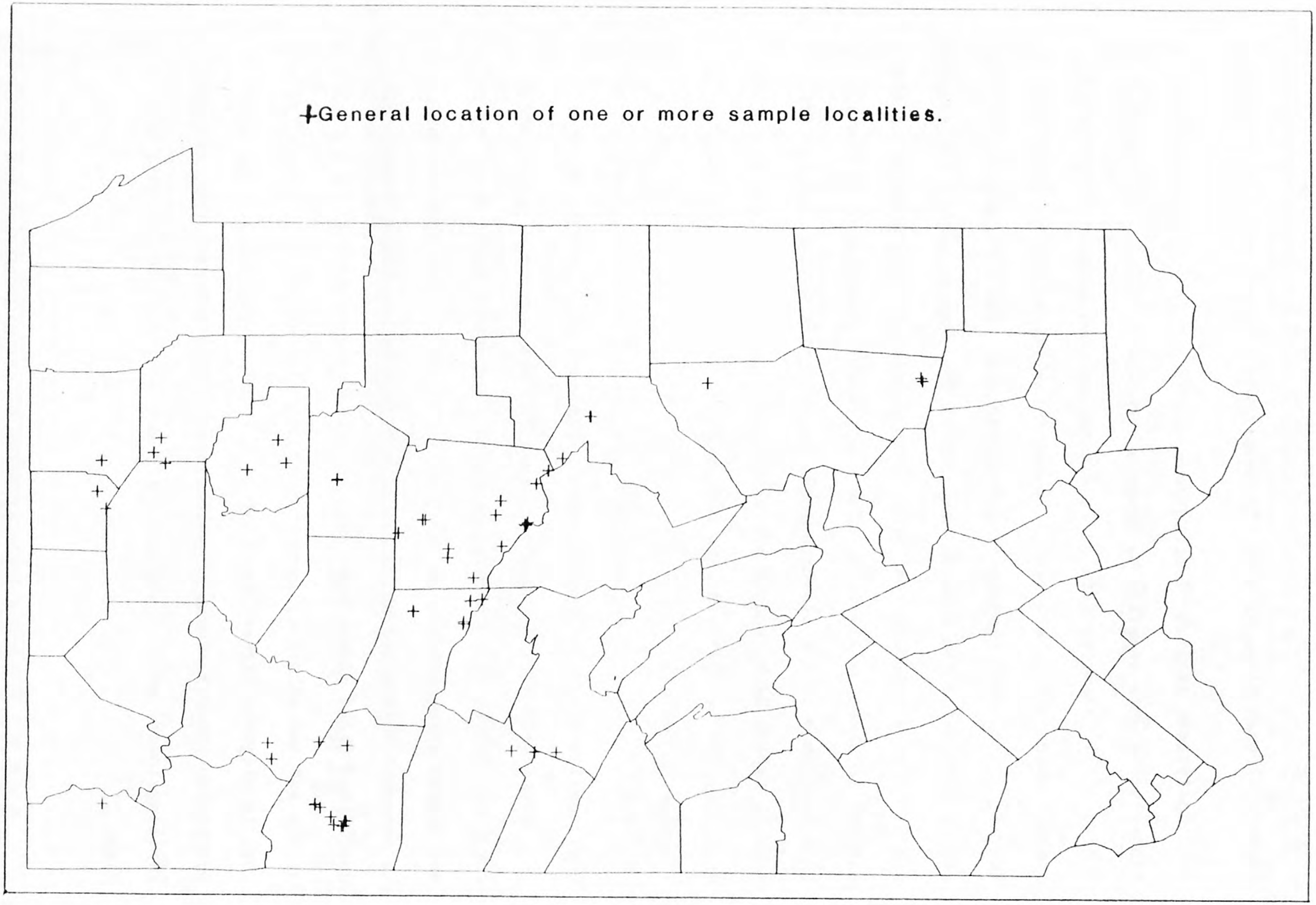

Figure 3.--Distribution of Pennsylvania bituminous coal samples.

Table 5a.-- Arithmetic mean, observed range, geometric mean and geometric deviation of proximate and ultimate analyses, heat of combustion, forms of sulfur, ash-fusion temperatures and free-swelling index of 132 coal samples from Pennsylvania.

[All values are in percent except Btu/lb, ash-fusion temperatures, and free-swelling index and are reported on the as-received basis. °F = 9/5°C + 32; Kcal/kg = (Btu/lb).]

	Arithmetic mean	Observed range Minimum	Observed range Maximum	Geometric mean	Geometric deviation	Geometric mean 548 samples
Proximate and ultimate analyses						
Moisture	2.4	0.5	14	1.9	1.9	2.5
Volatile matter	26.2	8.6	44.6	24.9	1.4	28.1
Fixed carbon	59.2	39.1	77.9	58.5	1.2	54.7
Ash	12.2	2.8	41.8	10.7	1.7	9.7
Hydrogen	4.7	3.3	5.8	4.7	1.1	4.9
Carbon	72.8	45.9	85.6	72.4	1.1	71.8
Nitrogen	1.2	.8	1.7	1.2	1.2	1.3
Oxygen	6.7	2.5	25	6.1	1.5	7.1
Sulfur	2.4	.5	10	1.7	2.3	1.4
Heat of combustion						
Btu/lb	12780	2140	15050	12630	1.2	12730
Forms of sulfur						
Sulfate	.13	.10	.67	.07	3.7	.04
Pyritic	1.5	.10	7.7	.52	6.3	.62
Organic	.82	.10	4.4	.72	1.6	.76
Ash-fusion temperature °C						
Initial deformation	1230	1030	1600	1220	1.1	1260
Softening temperature	1270	1050	1570	1260	1.1	1300
Fluid temperature	1340	1090	1600	1330	1.1	1360
Free-swelling Index	6.1	.5	9.0	5.3	2.1	5.6

Comparison of the geometric means for major and minor element oxides, (table 5b), shows equal values for Al_2O_3, MnO, and TiO_2 in the two sets of data. The means for CaO, MgO, Na_2O, and K_2O are significantly lower, whereas, P_2O_5 is significantly higher in Pennsylvania coal samples. The means for the other components generally vary by less than 20 percent.

Most of trace elements in Pennsylvania coal samples have geometric means higher than the average bituminous coal of this report. Only B, Ba, Cs, Cu, F, Mn, and U are higher in the average coal of this report; the variations for Cs, Cu, and Mn are less than 10 percent. Although the means for some of the trace elements are minimally higher in Pennsylvania coal, those for Ag, As, Ga, Ge, Hg, Li, Mo, Nb, Nd, Ni, Pb, Se, Sr, V, Y, and Zr are significantly higher.

Table 5b.--Arithmetic mean, observed range, geometric mean and geometric deviation of ash content and contents of eleven major and minor oxides in the laboratory ash of 132 coal samples from Pennsylvania.

[All samples were ashed at 525°C; all data except geometric deviation are in percent; L means less than value shown.]

Oxide	Arithmetic mean	Observed range		Geometric mean	Geometric deviation	Geometric mean 644 samples
		Minimum	Maximum			
(Ash)	13	2.8	43.8	11.3	1.7	9.76
SiO_2	42	9.5	78	40	1.4	43
Al_2O_3	26	4.9	42	24	1.5	24
CaO	1.4	.16	7.6	1.1	2.0	1.4
MgO	.56	.08	2.0	.48	1.7	.68
Na_2O	.25	.06L	2.4	.20	1.8	.34
K_2O	1.6	.06	4.2	1.2	2.2	1.6
Fe_2O_3	21	1.1	81	13	3.0	11
MnO	.02	.003	.31	.02	2.2	.02
TiO_2	1.3	.12	4.1	1.1	1.7	1.1
P_2O_5	.61	.04	17	.26	3.0	.13
SO_3	2.0	.24	14	1.4	2.2	1.7

Table 5c.--Arithmetic mean, observed range, geometric mean and geometric deviation of 38 elements in 132 coal samples from Pennsylvania.

[All data are in parts-per-million and are reported on a whole-coal basis; L means less than value shown.]

Element	Arithmetic mean	Observed range		Geometric mean	Geometric deviation	Geometric mean 644 samples
		Minimum	Maximum			
Ag	0.07	0.006	0.48	0.05	2.6	0.03
As	25	1.0L	170	11	4.3	8.4
B	19	1.0L	110	10	3.0	14
Ba	59	4.3	340	41	2.4	48
Be	2.5	.36	7.6	2.2	1.7	1.9
Cd	.12	.008	.85	.08	2.7	.07
Ce	23	.44	97	18	2.1	16
Co	9.0	1.2	84	6.6	2.1	6.2
Cr	21	2.3	56	17	1.9	14
Cs	1.1	.1L	8.0	.60	3.0	.66
Cu	19	2.7	140	14	1.9	15
Eu	.47	.12L	1.5	.40	1.7	.33
F	54	20L	340	32	2.2	51
Ga	8.2	1.5	35	7.0	1.7	4.8
Ge	4.5	.11L	36	2.0	4.4	1.1
Hf	.90	.1L	3.0	.66	2.3	.61
Hg	.33	.01L	1.8	.19	3.2	.12
La	13	2.0L	52	9.7	2.2	8.8
Li	35	1.8	370	20	2.8	15
Lu	.20	.1L	.8	.17	1.6	.15
Mn	21	1.4	250	13	2.6	14
Mo	3.5	.25L	12	2.5	2.4	1.5
Nb	3.1	.28	18	2.0	2.5	1.4
Nd	13	2.0L	48	6.1	3.2	4.2
Ni	21	2.7	85	16	2.1	12
Pb	13	2.0L	52	9.9	2.2	7.0
Sb	1.4	.1L	7.2	.85	2.7	.73
Sc	5.0	.7	13	4.2	1.8	3.3
Se	4.6	.8L	14	3.5	2.1	2.8
Sm	2.2	.5	7.4	1.9	1.7	1.6
Sr	130	12L	920	82	2.4	65
Tb	.39	.1L	1.3	.29	2.0	.26
U	1.5	.2L	6.3	.82	3.0	1.3
V	26	1.8	120	20	2.1	16
Y	11	1.1	37	8.4	2.0	6.2
Yb	1.1	.2L	4.2	.98	1.7	.84
Zn	24	3.2	150	17	2.2	14
Zr	31	2.0	170	19	2.7	13

Table 5d.--Descriptions for 132 bituminous coal samples from Pennsylvania.

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w199581	Pennsylvania	Somerset	401055n	790907w	Freeport	Upper Freeport	Channel	27.0
w199582	Pennsylvania	Somerset	395408n	790116w	Freeport	Upper Freeport	Channel	29.0
w199583	Pennsylvania	Clearfield	405742n	781043w	Kittanning	M Kittanning 1 Rider	Channel	18.0
w199584	Pennsylvania	Bedford	400917n	781457w	Freeport	Kelly Rider	Channel	15.0
w199585	Pennsylvania	Somerset	395256n	790242w	Freeport	Upper Freeport	Channel	34.0
w199586	Pennsylvania	Somerset	395457n	790540w	Clarion	Clarion-Brookville	Channel	12.0
w199587	Pennsylvania	Somerset	395302n	790202w	Freeport	Upper Freeport	Channel	30.0
w199588	Pennsylvania	Clearfield	405742n	781043w	Kittanning	M Kittanning 2 Rider	Channel	13.0
w199589	Pennsylvania	Somerset	395410n	790140w	Freeport	Upper Freeport	Channel	33.0
w199590	Pennsylvania	Clearfield	410847n	780454w	Kittanning	M Kittanning Rider	Channel	24.0
w199591	Pennsylvania	Clearfield	410847n	780454w	Kittanning	Upper Kittanning	Channel	17.0
w199592	Pennsylvania	Clearfield	410847n	780454w	Kittanning	Upper Kittanning	Channel	14.0
w199593	Pennsylvania	Jefferson	410619n	790429w	Kittanning	Middle Kittanning	Channel	22.0
w199594	Pennsylvania	Somerset	395410n	790140w	Freeport	U Freeport No 2 Ride	Channel	15.0
w199595	Pennsylvania	Cambria	403617n	782842w	Freeport	Lower Freeport	Channel	30.0
w199596	Pennsylvania	Sullivan	412849n	762004w	Kittanning	B	Channel	53.0
w199597	Pennsylvania	Clearfield	405518n	784709w	Freeport	Lower Freeport	Channel	34.0
w199598	Pennsylvania	Clearfield	405247n	781803w	Kittanning	Lower Kittanning	Channel	23.0
w199599	Pennsylvania	Clearfield	405708n	781112w	Kittanning	M Kittanning 1 Rider	Channel	6.0
w199600	Pennsylvania	Cambria	403646n	782837w	Clarion	Clarion	Channel	25.0
w199601	Pennsylvania	Clearfield	405710n	781117w	Kittanning	U Freeport No 2 Ride	Channel	14.0
w199602	Pennsylvania	Sullivan	412845n	762006w	Clarion	A	Channel	14.0
w199603	Pennsylvania	Sullivan	412805n	761940w	Kittanning	C	Channel	23.0
w199604	Pennsylvania	Lawrence	405310n	803059w	Clarion	Clarion	Channel	14.0
w199605	Pennsylvania	Lawrence	405618n	802449w	Kittanning	Lower Kittanning	Channel	24.0
w199606	Pennsylvania	Butler	405955n	800936w	Kittanning	Upper Kittanning	Channel	8.0
w199607	Pennsylvania	Mercer	411009n	801047w	Clarion	Brookville	Channel	17.0
w199608	Pennsylvania	Jefferson	410619n	790429w	Kittanning	Middle Kittanning	Channel	7.0
w199609	Pennsylvania	Clearfield	410557n	780815w	Kittanning	M Kittanning Rider	Channel	28.0
w199610	Pennsylvania	Clearfield	405808n	783930w	Kittanning	Upper Kittanning	Channel	26.0
w199611	Pennsylvania	Clearfield	405022n	783308w	Freeport	Lower Freeport	Channel	18.0
w199612	Pennsylvania	Clearfield	405022n	783308w	Freeport	Upper Freeport	Channel	17.0
w199613	Pennsylvania	Clearfield	404609n	782550w	Freeport	Upper Freeport	Channel	26.0
w199614	Pennsylvania	Clearfield	405528n	784705w	Kittanning	Upper Kittanning	Channel	29.0
w199717	Pennsylvania	Clearfield	405807n	784011w	Kittanning	Upper Kittanning	Channel	14.0

Table 5d.--Descriptions for 132 bituminous coal samples from Pennsylvania--continued

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w199718	Pennsylvania	Clearfield	405807n	784011w	Kittanning	Upper Kittanning	Channel	5.0
w199719	Pennsylvania	Cambria	403858n	784243w	Freeport	Upper Freeport	Channel	10.0
w199720	Pennsylvania	Clearfield	410847n	780454w	Kittanning	Middle Kittanning	Channel	16.0
w199721	Pennsylvania	Cambria	403858n	784243w	Freeport	Upper Freeport	Channel	30.0
w199722	Pennsylvania	Venango	411154n	795610w	Clarion	Brookville	Channel	17.0
w199723	Pennsylvania	Butler	410935n	795244w	Clarion	Brookville	Channel	20.0
w199724	Pennsylvania	Cambria	404115n	782650w	Freeport	Lower Freeport	Channel	7.0
w199725	Pennsylvania	Mercer	411009n	801047w	Clarion	Brookville	Channel	6.0
w199726	Pennsylvania	Clearfield	405914n	781943w	Kittanning	Middle Kittanning	Channel	28.0
w199727	Pennsylvania	Lawrence	405309n	803059w	Clarion	Brookville	Channel	7.0
w199728	Pennsylvania	Clearfield	405708n	781112w	Kittanning	Middle Kittanning	Channel	17.0
w199423	Pennsylvania	Greene	395719n	800953w	Pittsburgh	Pittsburgh No 8	Channel	61.0
w199424	Pennsylvania	Greene	394323n	801918w	Pittsburgh	Pittsburgh No 8	Channel	88.0
w199660	Pennsylvania	Clarion	410823n	792948w	Clarion	Clarion	Channel	6.0
w199661	Pennsylvania	Clarion	410955n	791845w	Clarion	Upper Clarion	Channel	26.0
w199662	Pennsylvania	Butler	405955n	800936w	Kittanning	Middle Kittanning	Channel	10.0
w199663	Pennsylvania	Westmoreland	400713n	792219w	Freeport	Upper Freeport	Channel	8.0
w199664	Pennsylvania	Somerset	395728n	791003w	Freeport	Upper Freeport	Channel	30.0
w199665	Pennsylvania	Clearfield	410557n	780815w	Kittanning	Middle Kittanning	Channel	14.0
w199666	Pennsylvania	Clearfield	405717n	781130w	Kittanning	Upper Kittanning	Channel	12.0
w199667	Pennsylvania	Clearfield	410557n	780815w	Kittanning	Middle Kittanning	Channel	19.0
w199668	Pennsylvania	Clarion	411439n	792108w	Clarion	Upper Clarion	Channel	8.0
w199669	Pennsylvania	Somerset	395742n	791000w	Freeport	Lower Freeport	Channel	10.0
w199670	Pennsylvania	Somerset	395654n	790834w	Freeport	Upper Freeport	Channel	24.0
w199671	Pennsylvania	Somerset	395302n	790202w	Freeport	U Freeport No 1 Rdr	Channel	7.0
w199672	Pennsylvania	Butler	405955n	800936w	Kittanning	Middle Kittanning	Channel	23.0
w199673	Pennsylvania	Somerset	395410n	790140w	Freeport	Upper Freeport Rider	Channel	7.0
w199674	Pennsylvania	Fulton	400902n	780822w	Kittanning	Barnett	Channel	27.0
w199675	Pennsylvania	Somerset	395408n	790116w	Freeport	Upper Freeport Rider	Channel	11.0
w199676	Pennsylvania	Clarion	411442n	792107w	Clarion	Lower Clarion	Channel	14.0
w199677	Pennsylvania	Fulton	400902n	780822w	Kittanning	Barnett	Channel	29.0
w199678	Pennsylvania	Clarion	411442n	792107w	Clarion	Lower Clarion	Channel	18.0
w199679	Pennsylvania	Fulton	400902n	780222w	Kittanning	Barnett	Channel	15.0
w199680	Pennsylvania	Somerset	395316n	790446w	Clarion	Clarion	Channel	32.0
w199681	Pennsylvania	Clarion	410823n	792948w	Clarion	Clarion	Channel	15.0

Table 5d.--Descriptions for 132 bituminous coal samples from Pennsylvania--continued

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w199682	Pennsylvania	Somerset	395410n	790140w	Freeport	Upper Freeport Rider	Channel	22.0
w199683	Pennsylvania	Somerset	395408n	790116w	Freeport	Upper Freeport Rider	Channel	22.0
w199684	Pennsylvania	Somerset	395654n	790834w	Freeport	Upper Freeport	Channel	6.0
w199685	Pennsylvania	Somerset	395728n	791003w	Freeport	Upper Freeport	Channel	4.0
w199686	Pennsylvania	Somerset	395742n	791006w	Freeport	Lower Freeport	Channel	28.0
w199687	Pennsylvania	Somerset	395316n	790446w	Clarion	Clarion	Channel	24.0
w199689	Pennsylvania	Clearfield	405717n	781130w	Kittanning	Upper Kittanning	Channel	11.0
w199690	Pennsylvania	Clearfield	410557n	780815w	Kittanning	Middle Kittanning	Channel	11.0
w199691	Pennsylvania	Clarion	410955n	791845w	Clarion	Upper Clarion	Channel	10.0
w199692	Pennsylvania	Clarion	411442n	792107w	Clarion	Lower Clarion	Channel	7.0
w199693	Pennsylvania	Somerset	395302n	790202w	Freeport	U Freeport No 1 Rdr	Channel	20.0
w199694	Pennsylvania	Cambria	403903n	784246w	Freeport	Lower Freeport	Channel	36.0
w199695	Pennsylvania	Clearfield	405212n	783256w	Freeport	Lower Freeport	Channel	29.0
w199696	Pennsylvania	Westmoreland	400713n	792219w	Freeport	Upper Freeport	Channel	25.0
w199697	Pennsylvania	Clarion	410823n	792948w	Clarion	Clarion	Channel	30.0
w199698	Pennsylvania	Clarion	411439n	792108w	Clarion	Upper Clarion	Channel	40.0
w199703	Pennsylvania	Cambria	403903n	784246w	Freeport	Lower Freeport	Channel	10.0
w199704	Pennsylvania	Venango	411154n	795610w	Clarion	Brookville	Channel	18.0
w199705	Pennsylvania	Clearfield	410216n	781822w	Kittanning	Lower Kittanning	Channel	13.0
w199706	Pennsylvania	Butler	410935n	795244w	Clarion	Brookville	Channel	20.0
w199707	Pennsylvania	Clearfield	405807n	784011w	Kittanning	Upper Kittanning	Channel	12.0
w199708	Pennsylvania	Clearfield	410847n	780454w	Kittanning	Middle Kittanning	Channel	16.0
w199709	Pennsylvania	Cambria	404115n	782650w	Freeport	Lower Freeport	Channel	9.0
w199710	Pennsylvania	Clearfield	405717n	781130w	Freeport	Lower Freeport	Channel	26.0
w199711	Pennsylvania	Clearfield	405521n	784702w	Freeport	Upper Freeport	Channel	9.0
w199712	Pennsylvania	Lawrence	405930n	802828w	Kittanning	Lower Kittanning	Channel	20.0
w199713	Pennsylvania	Clearfield	410216n	781822w	Kittanning	Lower Kittanning	Channel	23.0
w199714	Pennsylvania	Lawrence	405309n	803059w	Clarion	Brookville	Channel	23.0
w199715	Pennsylvania	Lawrence	405930n	802828w	Kittanning	Lower Kittanning	Channel	20.0
w199716	Pennsylvania	Clearfield	405521n	784702w	Freeport	Upper Freeport	Channel	8.0
w199729	Pennsylvania	Clearfield	405742n	781043w	Kittanning	Middle Kittanning	Channel	10.0
w199730	Pennsylvania	Clinton	411122n	780053w	Kittanning	Lower Kittanning	Channel	20.0
w199731	Pennsylvania	Venango	411458n	795358w	Clarion	Scrubgrass	Channel	12.0
w199732	Pennsylvania	Cambria	404131n	782328w	Clarion	Clarion	Channel	14.0
w199733	Pennsylvania	Cambria	404131n	782328w	Clarion	Clarion	Channel	9.0

Table 5d.--Descriptions for 132 bituminous coal samples from Pennsylvania--continued

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w199734	Pennsylvania	Clearfield	405708n	781112w	Kittanning	Middle Kittanning	Channel	6.0
w199735	Pennsylvania	Clearfield	405717n	781130w	Freeport	Lower Freeport	Channel	26.0
w199736	Pennsylvania	Clearfield	405914n	781943w	Kittanning	Middle Kittanning	Channel	8.0
w199737	Pennsylvania	Clearfield	405742n	781043w	Kittanning	Middle Kittanning	Channel	13.0
w199738	Pennsylvania	Clinton	411122n	780053w	Kittanning	Lower Kittanning	Channel	13.0
w199739	Pennsylvania	Mercer	411009n	801047w	Clarion	Brookville	Channel	5.0
w199740	Pennsylvania	Venango	411458n	795359w	Clarion	Scrubgrass	Channel	25.0
w201274	Pennsylvania	Venango	411154n	795610w	Clarion	Scrubgrass	Channel	12.0
w201275	Pennsylvania	Venango	411154n	795610w	Clarion	Clarion	Channel	15.0
w201276	Pennsylvania	Westmoreland	401040n	792329w	Freeport	Upper Freeport	Channel	14.0
w201277	Pennsylvania	Jefferson	410633n	790423w	Clarion	Brookville	Channel	13.0
w201278	Pennsylvania	Jefferson	410633n	790423w	Clarion	Brookville	Channel	14.0
w201279	Pennsylvania	Sullivan	412805n	761940w	Kittanning	B	Channel	9.0
w201280	Pennsylvania	Sullivan	412805n	761940w	Kittanning	B	Channel	9.0
w201281	Pennsylvania	Lycoming	412720n	772008w	Kittanning	Bloss	Channel	20.0
w201282	Pennsylvania	Lycoming	412720n	772008w	Kittanning	Bloss	Channel	8.0
w201283	Pennsylvania	Somerset	395457n	790540w	Clarion	Clarion-Brookville	Channel	15.0
w201284	Pennsylvania	Somerset	401017n	790105w	Kittanning	Upper Kittanning	Channel	24.0
w201285	Pennsylvania	Somerset	401017n	790105w	Kittanning	Upper Kittanning	Channel	39.0
w201286	Pennsylvania	Lycoming	412724n	772008w	Kittanning	Morgan-Cannal	Channel	15.0
w201287	Pennsylvania	Lycoming	412724n	772008w	Kittanning	Morgan-Cannal	Channel	16.0
w200449	Pennsylvania	Clinton	412019n	775326w	Kittanning	Lower Kittanning	Channel	69.0
w200450	Pennsylvania	Clinton	412018n	775302w	Kittanning	Lower Kittanning	Channel	76.0
w200451	Pennsylvania	Clinton	412013n	775300w	Clarion	Clarion	Channel	25.0
w196592	Pennsylvania	Mercer	410336n	801200w	allegheny	Brookville	Drill Core	14.0
w196593	Pennsylvania	Mercer	410336n	801200w	allegheny	Brookville	Drill Core	6.0
w196594	Pennsylvania	Mercer	410336n	801200w	allegheny	Brookville	Drill Core	18.0

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania.

[All analyses except Kcal/kg, Btu, free-swelling index and ash-fusion temperatures in percent. For each sample number, the analyses are reported three ways: first, as-received, second, moisture free, and third, moisture and ash free. All analyses by Coal Analysis Section, Department of Energy, Pittsburgh, Pa. B, not determined. 1600G for ash-fusion temperatures means greater than 1600 C.]

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w199581	2.3	16.6	57.3	23.8	3.9	63.4	1.0	5.0	2.9	6,080	10,940
	---	17.0	58.6	24.4	3.7	64.9	1.0	3.0	3.0	6,220	11,200
	---	22.5	77.5	---	4.9	85.8	1.4	4.0	3.9	8,230	14,810
w199582	2.3	19.0	66.8	11.9	4.3	75.9	1.3	5.1	1.5	7,350	13,230
	---	19.4	68.4	12.2	4.1	77.7	1.3	3.1	1.5	7,530	13,550
	---	22.1	77.9	---	4.7	88.5	1.5	3.6	1.7	8,570	15,420
w199583	1.8	24.2	65.0	9.0	4.9	76.2	1.4	4.2	4.4	7,560	13,600
	---	24.6	66.2	9.2	4.8	77.6	1.4	2.6	4.5	7,700	13,850
	---	27.1	72.9	---	5.3	85.4	1.6	2.9	4.9	8,470	15,250
w199584	1.8	23.1	67.0	8.1	4.7	77.5	1.6	7.1	.9	7,500	13,500
	---	23.5	68.2	8.2	4.6	78.9	1.6	5.6	.9	7,640	13,750
	---	25.6	74.4	---	5.0	86.0	1.8	6.1	1.0	8,320	14,980
w199585	2.3	18.4	65.5	13.8	4.5	74.6	1.3	4.9	.9	7,210	12,970
	---	18.8	67.0	14.1	4.3	76.4	1.3	2.9	.9	7,380	13,280
	---	21.9	78.1	---	5.1	88.9	1.5	3.4	1.1	8,590	15,460
w199586	11.1	23.2	59.0	6.7	4.7	67.9	1.1	19.1	.5	6,290	11,320
	---	26.1	66.4	7.5	3.9	76.4	1.2	10.4	.6	7,070	12,730
	---	28.2	71.8	---	4.2	82.6	1.3	11.2	.6	7,650	13,770
w199587	1.2	18.8	69.6	10.4	4.6	79.6	1.1	3.3	1.0	7,650	13,770
	---	19.0	70.4	10.5	4.5	80.6	1.1	2.3	1.0	7,740	13,940
	---	21.3	78.7	---	5.1	90.0	1.2	2.5	1.1	8,650	15,580
w199588	8.6	22.6	64.3	4.5	5.1	74.4	1.4	14.1	.5	7,110	12,800
	---	24.7	70.4	4.9	4.5	81.4	1.5	7.1	.5	7,780	14,000
	---	26.0	74.0	---	4.8	85.6	1.6	7.4	.6	8,180	14,730
w199589	1.6	18.4	68.8	11.2	4.5	77.1	1.4	4.4	1.3	7,540	13,570
	---	18.7	69.9	11.4	4.4	78.4	1.4	3.0	1.3	7,660	13,790
	---	21.1	78.9	---	5.0	88.4	1.6	3.4	1.5	8,650	15,560
w199590	3.7	23.5	62.8	10.0	5.1	74.5	1.4	6.4	2.6	7,400	13,330
	---	24.4	65.2	10.4	4.9	77.4	1.5	3.2	2.7	7,690	13,840
	---	27.2	72.8	---	5.4	86.3	1.6	3.6	3.0	8,580	15,440
w199591	5.1	25.4	62.7	6.8	5.2	76.8	1.4	8.9	1.0	7,560	13,600
	---	26.8	66.1	7.2	4.9	80.9	1.5	4.6	1.1	7,960	14,330
	---	28.8	71.2	---	5.3	87.2	1.6	5.0	1.1	8,580	15,440

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

Sample number	Air-dried loss	Forms of sulfur			Free swelling	Ash fusion temperature C		
		Sulfate	Pyritic	Organic		Initial deform.	soften.	fluid
w199581	0.4	0.46	1.56	0.87	1.0	1,130	1,155	1,175
	---	.47	1.60	.89				
	---	.62	2.11	1.18				
w199582	1.0	.17	.45	.84	9.0	1,600	1,600G	1,600G
	---	.17	.46	.86				
	---	.20	.52	.98				
w199583	.2	.41	2.89	1.10	3.0	1,130	1,160	1,195
	---	.42	2.94	1.12				
	---	.46	3.24	1.23				
w199584	.0	.01	.05	.84	3.0	1,600	1,600G	1,600G
	---	.01	.05	.86				
	---	.01	.06	.93				
w199585	1.3	.10	.16	.66	9.0	1,600	1,600G	1,600G
	---	.10	.16	.68				
	---	.12	.19	.79				
w199586	2.8	.00	.04	.46	1.0	1,350	1,390	1,600
	---	.00	.04	.52				
	---	.00	.05	.56				
w199587	.2	.02	.32	.61	9.0	1,600	1,600G	1,600G
	---	.02	.32	.62				
	---	.02	.36	.69				
w199588	4.3	.03	.02	.48	1.0	1,205	1,230	1,370
	---	.03	.02	.53				
	---	.03	.02	.55				
w199589	.7	.01	.75	.56	9.0	1,505	1,570	1,600
	---	.01	.76	.57				
	---	.01	.86	.64				
w199590	2.6	.31	1.85	.49	9.0	1,100	1,160	1,205
	---	.32	1.92	.51				
	---	.36	2.14	.57				
w199591	3.8	.01	.13	.88	9.0	1,345	1,400	1,450
	---	.01	.14	.93				
	---	.01	.15	1.00				

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w199592	1.6	25.1	58.6	14.7	4.8	72.4	1.4	5.4	1.3	7,140	12,850
	---	25.5	59.6	14.9	4.7	73.6	1.4	4.0	1.3	7,260	13,060
	---	30.0	70.0	---	5.5	86.5	1.7	4.8	1.6	8,530	15,350
w199593	3.0	32.7	57.0	7.3	5.4	74.6	1.4	10.4	.8	7,320	13,180
	---	33.7	58.8	7.5	5.2	76.9	1.4	8.0	.8	7,550	13,580
	---	36.5	63.5	---	5.6	83.2	1.6	8.6	.9	8,160	14,690
w199594	1.8	23.0	60.8	14.4	4.5	70.1	1.2	4.3	5.4	7,020	12,630
	---	23.4	61.9	14.7	4.4	71.4	1.2	2.7	5.5	7,150	12,860
	---	27.4	72.6	---	5.1	83.7	1.4	3.2	6.4	8,370	15,070
w199595	13.5	26.6	56.0	3.9	5.0	64.5	1.1	24.9	.5	5,990	10,780
	---	30.8	64.7	4.5	4.0	74.6	1.3	14.9	.6	6,920	12,460
	---	32.2	67.8	---	4.2	78.1	1.3	15.6	.6	7,250	13,050
w199596	4.3	9.7	75.3	10.7	3.8	77.2	1.1	6.5	.6	7,200	12,960
	---	10.1	78.7	11.2	3.5	80.7	1.1	2.8	.6	7,520	13,540
	---	11.4	88.6	---	3.9	90.8	1.3	3.2	.7	8,470	15,250
w199597	2.1	29.3	60.5	8.1	5.2	76.9	1.4	6.5	1.9	7,630	13,730
	---	29.9	61.8	8.3	5.1	78.5	1.4	4.7	1.9	7,790	14,030
	---	32.6	67.4	---	5.5	85.6	1.6	5.2	2.1	8,500	15,300
w199598	2.1	23.6	67.8	6.5	4.8	81.0	1.2	5.6	.9	7,900	14,210
	---	24.1	69.3	6.6	4.7	82.7	1.2	3.8	.9	8,070	14,520
	---	25.8	74.2	---	5.0	88.6	1.3	4.1	1.0	8,640	15,550
w199599	2.8	21.7	62.9	12.6	4.8	73.4	1.2	5.3	2.7	7,220	12,990
	---	22.3	64.7	13.0	4.6	75.5	1.2	2.9	2.8	7,420	13,360
	---	25.7	74.3	---	5.3	86.8	1.4	3.3	3.2	8,530	15,350
w199600	2.4	29.0	60.1	8.5	5.1	77.0	1.1	6.9	1.4	7,490	13,490
	---	29.7	61.6	8.7	5.0	78.9	1.1	4.9	1.4	7,680	13,820
	---	32.5	67.5	---	5.4	86.4	1.2	5.3	1.6	8,410	15,140
w199601	2.5	23.3	68.8	5.4	5.0	81.1	1.3	4.6	2.5	7,920	14,250
	---	23.9	70.6	5.5	4.8	83.2	1.3	2.4	2.6	8,120	14,620
	---	25.3	74.7	---	5.1	88.1	1.4	2.6	2.7	8,600	15,480
w199602	1.3	10.1	70.0	18.6	3.4	72.4	.8	3.8	1.0	6,710	12,080
	---	10.2	70.9	18.8	3.3	73.4	.8	2.7	1.0	6,800	12,240
	---	12.6	87.4	---	4.1	90.4	1.0	3.3	1.2	8,380	15,080
w199603	1.6	8.6	77.9	11.9	3.3	78.9	.9	4.4	.6	7,320	13,180
	---	8.7	79.2	12.1	3.2	80.2	.9	3.0	.6	7,440	13,400
	---	9.9	90.1	---	3.6	91.2	1.0	3.4	.7	8,470	15,240

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

Sample number	Air-dried loss	Forms of sulfur Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C Initial deform.	soften.	fluid
W199592	0.6	0.04	0.52	0.70	9.0	1,490	1,545	1,595
	---	.04	.53	.71				
	---	.05	.62	.84				
W199593	.8	.01	.08	.74	2.0	1,600	1,600G	1,600G
	---	.01	.08	.76				
	---	.01	.09	.82				
W199594	.8	.17	4.11	1.14	9.0	1,100	1,155	1,205
	---	.17	4.19	1.16				
	---	.20	4.90	1.36				
W199595	8.5	.01	.07	.45	.0	1,270	1,325	1,375
	---	.01	.08	.52				
	---	.01	.08	.54				
W199596	2.9	.01	.03	.58	.0	1,600	1,600G	1,600G
	---	.01	.03	.61				
	---	.01	.04	.68				
W199597	1.0	.01	1.17	.74	9.0	1,235	1,290	1,350
	---	.01	1.20	.76				
	---	.01	1.30	.82				
W199598	.7	.08	.09	.71	9.0	1,600	1,600G	1,600G
	---	.08	.09	.73				
	---	.09	.10	.78				
W199599	1.2	.24	1.68	.80	9.0	1,115	1,170	1,230
	---	.25	1.73	.82				
	---	.28	1.99	.95				
W199600	.6	.20	.71	.52	9.0	1,140	1,280	1,415
	---	.20	.73	.53				
	---	.22	.80	.58				
W199601	.8	.24	1.69	.58	9.0	1,130	1,160	1,315
	---	.25	1.73	.59				
	---	.26	1.83	.63				
W199602	.4	.05	.15	.76	.0	1,600	1,600G	1,600G
	---	.05	.15	.77				
	---	.06	.19	.95				

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w199604	4.4	31.0	60.4	4.2	5.0	77.6	1.3	10.8	1.1	7,490	13,480
	---	32.4	63.2	4.4	4.7	81.2	1.4	7.2	1.2	7,830	14,100
	---	33.9	66.1	---	4.9	84.9	1.4	7.5	1.2	8,190	14,740
w199605	2.3	36.0	45.8	15.9	4.9	66.6	1.4	7.9	3.4	6,660	11,990
	---	36.8	46.9	16.3	4.8	68.2	1.4	6.0	3.5	6,820	12,270
	---	44.0	56.0	---	5.7	81.4	1.7	7.2	4.2	8,140	14,650
w199606	5.6	30.5	51.0	12.9	5.0	66.5	1.2	13.9	.6	6,380	11,480
	---	32.3	54.0	13.7	4.6	70.4	1.3	9.5	.6	6,760	12,160
	---	37.4	62.6	---	5.4	81.6	1.5	10.9	.7	7,830	14,090
w199607	3.9	37.5	51.9	6.7	5.5	73.5	1.3	11.7	1.2	7,250	13,040
	---	39.0	54.0	7.0	5.3	76.5	1.4	8.6	1.2	7,540	13,570
	---	41.9	58.1	---	5.7	82.2	1.5	9.2	1.3	8,110	14,590
w199608	4.0	31.0	54.8	10.2	5.1	71.8	1.2	11.2	.6	7,040	12,670
	---	32.3	57.1	10.6	4.8	74.8	1.2	8.0	.6	7,330	13,200
	---	36.1	63.9	---	5.4	83.7	1.4	8.9	.7	8,200	14,770
w199609	2.6	23.3	65.5	8.6	4.8	77.9	1.5	6.8	.5	7,630	13,740
	---	23.9	67.2	8.8	4.6	80.0	1.5	4.6	.5	7,840	14,100
	---	26.2	73.8	---	5.1	87.7	1.7	5.1	.6	8,590	15,470
w199610	1.3	26.5	58.3	13.9	4.7	73.4	1.1	5.1	1.8	7,190	12,940
	---	26.8	59.1	14.1	4.6	74.4	1.1	4.0	1.8	7,280	13,110
	---	31.2	68.7	---	5.4	86.6	1.3	4.7	2.1	8,470	15,250
w199611	2.0	24.8	61.6	11.6	4.8	75.3	1.2	5.6	1.5	7,360	13,240
	---	25.3	62.9	11.8	4.7	76.8	1.2	3.9	1.5	7,510	13,510
	---	28.7	71.3	---	5.3	87.2	1.4	4.4	1.7	8,510	15,320
w199612	1.2	25.5	58.5	14.8	4.6	72.6	1.2	4.7	2.1	7,160	12,890
	---	25.8	59.2	15.0	4.5	73.5	1.2	3.7	2.1	7,250	13,050
	---	30.4	69.6	---	5.3	86.4	1.4	4.3	2.5	8,520	15,340
w199613	1.4	24.6	66.0	8.0	4.8	79.9	1.4	4.9	1.1	7,800	14,040
	---	24.9	66.9	8.1	4.7	81.0	1.4	3.7	1.1	7,910	14,240
	---	27.2	72.8	---	5.1	88.2	1.5	4.0	1.2	8,610	15,490
w199614	1.4	28.2	57.5	12.9	4.7	73.7	1.3	5.5	1.9	7,220	13,000
	---	28.6	58.3	13.1	4.6	74.7	1.3	4.3	1.9	7,320	13,180
	---	32.9	67.1	---	5.3	86.0	1.5	5.0	2.2	8,420	15,160
w199717	3.1	25.6	62.9	8.4	4.9	76.2	1.2	8.5	.7	7,360	13,240
	---	26.4	64.9	8.7	4.7	78.6	1.2	5.9	.7	7,590	13,670
	---	28.9	71.1	---	5.1	86.1	1.4	6.5	.8	8,310	14,960

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

Sample number	Air-dried loss	Forms of sulfur Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C Initial deform.	soften.	fluid
w199604	1.3	0.17	0.14	0.75	7.0	1,230	1,295	1,450
	---	.18	.15	.78				
	---	.19	.15	.82				
w199605	.1	.12	2.59	.72	5.0	1,170	1,200	1,350
	---	.12	2.65	.74				
	---	.15	3.17	.88				
w199606	.7	.04	.03	.50	1.0	1,390	1,415	1,600
	---	.04	.03	.53				
	---	.05	.04	.61				
w199607	.4	.09	.55	.59	5.0	1,600	1,600G	1,600G
	---	.09	.57	.61				
	---	.10	.62	.66				
w199608	1.5	.03	.02	.54	3.0	1,600	1,600G	1,600G
	---	.03	.02	.56				
	---	.03	.02	.63				
w199609	1.0	.04	.02	.43	9.0	1,600	1,600G	1,600G
	---	.04	.02	.44				
	---	.05	.02	.48				
w199610	.1	.15	.00	1.63	9.0	1,330	1,360	1,500
	---	.15	.00	1.65				
	---	.18	.00	1.92				
w199611	.6	.14	.75	.61	9.0	1,600	1,600G	1,600G
	---	.14	.77	.62				
	---	.16	.87	.71				
w199612	.1	.10	1.49	.55	9.0	1,290	1,315	1,590
	---	.10	1.51	.56				
	---	.12	1.77	.65				
w199613	.2	.10	.50	.48	9.0	1,440	1,530	1,600
	---	.10	.51	.49				
	---	.11	.55	.53				
w199614	.1	.14	1.15	.63	8.0	1,290	1,320	1,410
	---	.14	1.17	.64				
	---	.16	1.34	.74				
w199717	.7	.00	.05	.69	3.0	1,600	1,600G	1,600G
	---	.00	.05	.71				
		.00	.06	.78				

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
w199718	6.0	25.3	59.3	9.4	4.7	71.0	1.2	13.0	0.7	6,770	12,190
	---	26.9	63.1	10.0	4.3	75.5	1.3	8.2	.7	7,200	12,970
	---	29.9	70.1	---	4.8	83.9	1.4	9.1	.8	8,000	14,410
w199719	1.8	27.4	62.9	7.9	5.0	78.1	1.3	4.5	3.3	7,670	13,810
	---	27.9	64.1	8.0	4.9	79.5	1.3	3.0	3.4	7,820	14,070
	---	30.3	69.7	---	5.3	86.5	1.4	3.2	3.7	8,500	15,300
w199720	3.4	21.8	64.3	10.5	4.9	75.7	1.3	6.6	1.1	7,360	13,250
	---	22.6	66.6	10.9	4.7	78.4	1.3	3.7	1.1	7,620	13,720
	---	25.3	74.7	---	5.3	87.9	1.5	4.2	1.3	8,550	15,390
w199721	.8	27.5	60.0	11.7	4.9	75.5	1.2	3.4	3.3	7,470	13,450
	---	27.7	60.5	11.8	4.8	76.1	1.2	2.7	3.3	7,530	13,560
	---	31.4	68.6	---	5.5	86.3	1.4	3.1	3.8	8,540	15,370
w199722	1.9	39.5	48.3	10.3	5.1	68.6	1.1	6.9	8.0	7,000	12,600
	---	40.3	49.2	10.5	5.0	69.9	1.1	5.3	8.2	7,140	12,840
	---	45.0	55.0	---	5.6	78.1	1.3	5.9	9.1	7,970	14,350
w199723	2.5	38.2	50.9	8.4	5.1	70.2	1.2	9.2	5.9	7,130	12,840
	---	39.2	52.2	8.6	4.9	72.0	1.2	7.2	6.1	7,320	13,170
	---	42.9	57.1	---	5.4	78.8	1.3	7.8	6.6	8,010	14,410
w199724	3.8	25.7	62.2	8.3	5.0	75.4	1.4	9.3	.7	7,290	13,120
	---	26.7	64.7	8.6	4.8	78.4	1.5	6.2	.7	7,580	13,640
	---	29.2	70.8	---	5.2	85.8	1.6	6.7	.8	8,290	14,930
w199725	2.7	34.5	40.4	22.4	4.7	55.0	1.2	8.7	8.1	5,710	10,270
	---	35.5	41.5	23.0	4.5	56.5	1.2	6.5	8.3	5,870	10,560
	---	46.1	53.9	---	5.9	73.4	1.6	8.4	10.8	7,620	13,720
w199726	2.4	25.7	56.6	15.3	4.8	69.4	1.2	5.8	3.4	6,920	12,450
	---	26.3	58.0	15.7	4.6	71.1	1.2	3.8	3.5	7,090	12,760
	---	31.2	68.8	---	5.5	84.3	1.5	4.5	4.1	8,410	15,130
w199727	2.3	38.9	46.5	12.3	5.5	69.2	1.5	8.5	3.1	7,040	12,670
	---	39.8	47.6	12.6	5.4	70.8	1.5	6.6	3.2	7,200	12,970
	---	45.6	54.4	---	6.1	81.0	1.8	7.6	3.6	8,240	14,840
w199728	1.9	24.6	68.3	5.2	5.2	80.6	1.6	5.2	2.2	8,000	14,400
	---	25.1	69.6	5.3	5.1	82.2	1.6	3.6	2.2	8,160	14,680
	---	26.5	73.5	---	5.4	86.8	1.7	3.8	2.4	8,610	15,500
w199423	1.1	37.3	53.7	7.9	5.3	75.2	1.4	7.5	2.7	7,540	13,560
	---	37.7	54.3	8.0	5.2	76.0	1.4	6.6	2.7	7,620	13,710
	---	41.0	59.0	---	5.7	82.6	1.5	7.2	3.0	8,280	14,910

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w199718	1.5	0.00	0.03	0.67	0.5	1,220	1,245	1,290
	---	.00	.03	.71				
	---	.00	.04	.79				
w199719	.2	.37	2.06	.91	9.0	1,040	1,060	1,150
	---	.38	2.10	.93				
	---	.41	2.28	1.01				
w199720	2.2	.23	.22	.64	8.5	1,600	1,600G	1,600G
	---	.24	.23	.66				
	---	.27	.26	.74				
w199721	.0	.13	2.25	.95	9.0	1,110	1,170	1,390
	---	.13	2.27	.96				
	---	.15	2.57	1.09				
w199722	.1	.43	5.25	2.36	5.5	1,250	1,265	1,280
	---	.44	5.35	2.41				
	---	.49	5.98	2.69				
w199723	.1	.64	4.13	1.17	5.5	1,175	1,195	1,210
	---	.66	4.24	1.20				
	---	.72	4.64	1.31				
w199724	1.2	.01	.02	.66	4.5	1,600	1,600G	1,600G
	---	.01	.02	.69				
	---	.01	.02	.75				
w199725	.5	.32	6.60	1.19	3.5	1,125	1,180	1,235
	---	.33	6.78	1.22				
	---	.43	8.81	1.59				
w199726	1.0	.01	2.58	.83	9.0	1,155	1,205	1,265
	---	.01	2.64	.85				
	---	.01	3.13	1.01				
w199727	.4	.02	2.50	.55	6.0	1,155	1,210	1,270
	---	.02	2.56	.56				
	---	.02	2.93	.64				
w199728	.7	.01	1.31	.90	9.0	1,155	1,205	1,265
	---	.01	1.34	.92				
	---	.01	1.41	.97				
w199423	.1	.03	1.53	1.11	8.5	1,095	1,140	1,250
	---	.03	1.55	1.12				
	---	.03	1.68	1.22				

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w199424	1.1	37.9	52.6	8.4	5.0	75.1	1.4	7.2	2.8	7,510	13,510
	---	38.3	53.2	8.5	4.9	75.9	1.4	6.3	2.8	7,590	13,660
	---	41.9	58.1	---	5.4	83.0	1.5	6.9	3.1	8,300	14,930
w199660	1.0	37.8	45.4	15.8	4.8	64.9	1.1	4.5	9.0	6,790	12,220
	---	38.2	45.9	16.0	4.7	65.6	1.1	3.6	9.1	6,860	12,340
	---	45.4	54.6	---	5.6	78.0	1.3	4.3	10.8	8,160	14,690
w199661	1.3	39.5	48.9	10.3	5.2	71.6	1.2	5.7	6.0	7,320	13,170
	---	40.0	49.5	10.4	5.1	72.5	1.2	4.6	6.1	7,410	13,340
	---	44.7	55.3	---	5.7	81.0	1.4	5.1	6.8	8,280	14,900
w199662	2.2	39.3	50.2	8.3	5.2	73.6	1.3	8.6	3.0	7,380	13,290
	---	40.2	51.3	8.5	5.1	75.3	1.3	6.8	3.1	7,550	13,590
	---	43.9	56.1	---	5.5	82.2	1.5	7.4	3.4	8,250	14,850
w199663	1.3	25.7	59.5	13.5	4.6	72.9	1.3	4.3	3.4	7,200	12,950
	---	26.0	60.3	13.7	4.5	73.9	1.3	3.2	3.4	7,290	13,120
	---	30.2	69.8	---	5.2	85.6	1.5	3.7	4.0	8,450	15,200
w199664	1.3	19.0	60.5	19.2	4.0	67.5	1.0	2.9	5.4	6,650	11,970
	---	19.3	61.3	19.5	3.9	68.4	1.0	1.8	5.5	6,740	12,130
	---	23.9	76.1	---	4.8	84.9	1.3	2.2	6.8	8,370	15,060
w199665	1.8	21.2	65.2	11.8	4.5	75.8	1.2	4.5	2.0	7,360	13,240
	---	21.6	66.4	12.0	4.4	77.2	1.2	3.0	2.0	7,490	13,480
	---	24.5	75.5	---	5.0	87.7	1.4	3.4	2.3	8,510	15,320
w199666	1.4	21.7	69.4	7.5	4.7	81.6	1.2	4.4	.5	7,890	14,200
	---	22.0	70.4	7.6	4.6	82.8	1.2	3.2	.5	8,000	14,400
	---	23.8	76.2	---	5.0	89.6	1.3	3.5	.5	8,660	15,590
w199667	2.3	23.6	66.6	7.5	4.8	78.5	1.3	5.1	2.8	7,680	13,830
	---	24.2	68.2	7.7	4.7	80.3	1.3	3.1	2.9	7,870	14,160
	---	26.2	73.8	---	5.0	87.0	1.4	3.4	3.1	8,520	15,330
w199668	1.0	34.8	42.8	21.4	4.5	61.6	.9	4.5	7.2	6,320	11,380
	---	35.2	43.2	21.6	4.4	62.2	.9	3.6	7.3	6,390	11,500
	---	44.8	55.2	---	5.7	79.4	1.2	4.7	9.3	8,150	14,670
w199669	3.5	19.9	64.5	12.1	4.5	72.2	1.1	7.1	2.9	7,030	12,660
	---	20.6	66.8	12.5	4.3	74.8	1.1	4.1	3.0	7,290	13,120
	---	23.6	76.4	---	4.9	85.5	1.3	4.7	3.4	8,330	15,000
w199670	.9	18.6	70.1	10.4	4.5	77.7	1.2	3.9	2.4	7,590	13,660
	---	18.8	70.7	10.5	4.4	78.4	1.2	3.1	2.4	7,660	13,790
	---	21.0	79.0	---	5.0	87.6	1.4	3.5	2.7	8,560	15,400

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

Sample number	Air-dried loss	Forms of sulfur: Sulfate	Forms of sulfur: Pyritic	Forms of sulfur: Organic	Free swelling	Ash fusion temperature C: Initial deform.	Ash fusion temperature C: soften.	Ash fusion temperature C: fluid
w199424	0.1	0.12	1.15	1.55	8.5	1,115	1,145	1,320
	---	.12	1.16	1.57				
	---	.13	1.27	1.71				
w199660	.0	.24	4.32	4.41	6.5	1,155	1,180	1,280
	---	.24	4.36	4.45				
	---	.29	5.19	5.30				
w199661	.1	.16	4.43	1.39	8.0	1,195	1,220	1,275
	---	.16	4.49	1.41				
	---	.18	5.01	1.57				
w199662	.3	.14	1.88	1.02	6.0	1,140	1,200	1,320
	---	.14	1.92	1.04				
	---	.16	2.10	1.14				
w199663	.2	.31	2.20	.87	8.5	1,230	1,320	1,370
	---	.31	2.23	.88				
	---	.36	2.58	1.02				
w199664	.2	.27	4.40	.75	8.0	1,105	1,130	1,255
	---	.27	4.46	.76				
	---	.34	5.53	.94				
w199665	.6	.16	1.16	.72	6.5	1,270	1,305	1,375
	---	.16	1.18	.73				
	---	.19	1.34	.83				
w199666	.5	.02	.02	.45	9.0	1,600	1,600G	1,600G
	---	.02	.02	.46				
	---	.02	.02	.49				
w199667	.7	.31	1.41	1.09	9.0	1,140	1,260	1,380
	---	.32	1.44	1.12				
	---	.34	1.56	1.21				
w199668	.2	.24	6.21	.70	3.5	1,025	1,055	1,210
	---	.24	6.27	.71				
	---	.31	8.00	.90				
w199669	.5	.67	1.53	.67	5.5	1,100	1,170	1,290
	---	.69	1.59	.69				
	---	.79	1.81	.79				
w199670	.0	.13	1.56	.69	9.0	1,165	1,260	1,415
	---	.13	1.57	.70				
	---	.15	1.76	.78				

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

Sample number	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w199671	1.2	18.9	63.7	16.2	4.3	72.6	1.1	4.7	1.1	7,040	12,670
	---	19.1	64.5	16.4	4.2	73.5	1.1	3.7	1.1	7,120	12,820
	---	22.9	77.1	---	5.0	87.9	1.3	4.4	1.3	8,520	15,340
w199672	2.2	38.3	53.7	5.8	5.3	75.3	1.3	8.9	3.3	7,490	13,490
	---	39.2	54.9	5.9	5.2	77.0	1.3	7.1	3.4	7,660	13,790
	---	41.6	58.4	---	5.5	81.8	1.4	7.5	3.6	8,140	14,660
w199673	1.3	18.0	60.3	20.4	3.9	67.5	1.1	4.7	2.4	6,570	11,820
	---	18.2	61.1	20.7	3.8	68.4	1.1	3.6	2.4	6,650	11,970
	---	23.0	77.0	---	4.8	86.2	1.4	4.5	3.1	8,390	15,090
w199674	.5	16.5	71.9	11.1	4.2	79.8	1.3	3.0	.7	7,590	13,660
	---	16.6	72.3	11.2	4.2	80.2	1.3	2.6	.7	7,630	13,730
	---	18.7	81.3	---	4.7	90.3	1.5	2.9	.8	8,590	15,450
w199675	2.6	17.9	67.0	12.5	4.4	74.9	1.2	6.6	.5	7,250	13,050
	---	18.4	68.8	12.8	4.2	76.9	1.2	4.4	.5	7,440	13,390
	---	21.1	78.9	---	4.8	88.2	1.4	5.1	.6	8,540	15,370
w199676	1.1	39.1	49.0	10.8	5.2	72.3	1.1	6.6	3.9	7,280	13,110
	---	39.5	49.5	10.9	5.1	73.1	1.1	5.7	3.9	7,360	13,250
	---	44.4	55.6	---	5.8	82.1	1.2	6.4	4.4	8,260	14,880
w199677	.7	16.8	72.7	9.8	4.2	80.3	1.3	3.6	.9	7,680	13,820
	---	16.9	73.2	9.9	4.2	80.9	1.3	3.0	.9	7,730	13,920
	---	18.8	81.2	---	4.6	89.7	1.5	3.3	1.0	8,580	15,450
w199678	1.3	38.4	54.0	6.3	5.4	76.3	1.1	7.2	3.7	7,670	13,810
	---	38.9	54.7	6.4	5.3	77.3	1.1	6.1	3.7	7,780	14,000
	---	41.6	58.4	---	5.7	82.6	1.2	6.5	4.0	8,310	14,950
w199679	.9	15.5	65.6	18.0	3.8	72.0	1.1	3.8	1.4	6,840	12,320
	---	15.6	66.2	18.2	3.7	72.7	1.1	3.0	1.4	6,910	12,430
	---	19.1	80.9	---	4.6	88.8	1.4	3.7	1.7	8,440	15,190
w199680	.6	23.0	66.3	10.1	4.5	80.0	1.3	2.8	1.5	7,680	13,820
	---	23.1	66.7	10.2	4.5	80.5	1.3	2.3	1.5	7,730	13,910
	---	25.8	74.2	---	5.0	89.6	1.5	2.5	1.7	8,600	15,480
w199681	1.2	37.7	46.3	14.8	5.0	67.8	1.2	6.2	5.2	6,860	12,350
	---	38.2	46.9	15.0	4.9	68.6	1.2	5.2	5.3	6,950	12,500
	---	44.9	55.1	---	5.8	80.7	1.4	6.1	6.2	8,170	14,700
w199682	1.2	20.2	67.3	11.3	4.5	75.6	1.2	4.4	3.0	7,450	13,420
	---	20.4	68.1	11.4	4.4	76.5	1.2	3.4	3.0	7,540	13,580
	---	23.1	76.9	---	5.0	86.4	1.4	3.8	3.4	8,520	15,330

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

Sample number	Air-dried loss	Forms of sulfur: Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C: Initial deform.	soften.	fluid
W199671	0.1	0.18	0.34	0.57	8.5	1,600	1,600G	1,600G
	---	.18	.34	.58				
	---	.22	.41	.69				
W199672	.1	.08	2.25	.98	5.0	1,130	1,195	1,350
	---	.08	2.30	1.00				
	---	.09	2.45	1.07				
W199673	.1	.28	1.61	.53	7.0	1,320	1,400	1,600
	---	.28	1.63	.54				
	---	.36	2.06	.68				
W199674	.1	.01	.05	.64	8.0	1,600	1,600G	1,600G
	---	.01	.05	.64				
	---	.01	.06	.72				
W199675	1.1	.01	.03	.42	3.5	1,600	1,600G	1,600G
	---	.01	.03	.43				
	---	.01	.04	.49				
W199676	.1	.06	2.30	1.57	7.0	1,200	1,320	1,410
	---	.06	2.33	1.59				
	---	.07	2.61	1.78				
W199677	.0	.05	.09	.71	6.5	1,600	1,600G	1,600G
	---	.05	.09	.72				
	---	.06	.10	.79				
W199678	.1	.11	2.32	1.32	8.0	1,050	1,070	1,095
	---	.11	2.35	1.34				
	---	.12	2.51	1.43				
W199679	.0	.16	.69	.57	1.5	1,600	1,600G	1,600G
	---	.16	.70	.58				
	---	.20	.85	.70				
W199680	.0	.06	.94	.45	8.0	1,470	1,560	1,600
	---	.06	.95	.45				
	---	.07	1.05	.50				
W199681	.1	.12	3.63	1.41	7.5	1,175	1,305	1,330
	---	.12	3.67	1.43				
	---	.14	4.32	1.68				
W199682	.1	.19	2.06	.74	9.0	1,145	1,225	1,320
	---	.19	2.09	.75				
	---	.22	2.35	.85				

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w199683	3.7	19.4	70.4	6.5	4.8	80.4	1.3	6.6	0.5	7,730	13,910
	---	20.1	73.1	6.7	4.6	83.5	1.3	3.4	.5	8,030	14,450
	---	21.6	78.4	---	4.9	89.5	1.4	3.7	.6	8,610	15,490
w199684	1.2	15.8	46.3	36.7	3.3	51.6	.8	5.3	2.3	5,070	9,120
	---	16.0	46.9	37.1	3.2	52.2	.8	4.3	2.3	5,130	9,230
	---	25.4	74.6	---	5.1	83.1	1.3	6.8	3.7	8,160	14,690
w199685	1.0	19.9	55.2	23.9	3.7	60.8	.9	2.5	8.2	6,060	10,910
	---	20.1	55.8	24.1	3.6	61.4	.9	1.6	8.3	6,120	11,020
	---	26.5	73.5	---	4.8	81.0	1.2	2.1	10.9	8,070	14,520
w199686	2.0	18.4	70.3	9.3	4.6	78.2	1.2	4.8	1.9	7,620	13,720
	---	18.8	71.7	9.5	4.5	79.8	1.2	3.1	1.9	7,780	14,000
	---	20.7	79.3	---	4.9	88.2	1.4	3.4	2.1	8,600	15,470
w199687	1.5	20.7	55.9	21.9	4.0	65.7	.9	5.9	1.6	6,360	11,450
	---	21.0	56.8	22.2	3.9	66.7	.9	4.6	1.6	6,460	11,620
	---	27.0	73.0	---	5.0	85.8	1.2	6.0	2.1	8,300	14,950
w199689	1.2	21.9	67.0	9.9	4.6	79.4	1.2	4.5	.5	7,650	13,780
	---	22.2	67.8	10.0	4.5	80.4	1.2	3.5	.5	7,750	13,950
	---	24.6	75.4	---	5.0	89.3	1.3	3.9	.6	8,610	15,500
w199690	1.8	18.6	44.2	35.4	3.5	51.8	.8	5.5	3.0	5,060	9,100
	---	18.9	45.0	36.0	3.4	52.7	.8	4.0	3.1	5,150	9,270
	---	29.6	70.4	---	5.3	82.5	1.3	6.2	4.8	8,050	14,500
w199691	1.1	35.3	46.0	17.6	4.7	66.1	1.0	6.0	4.7	6,680	12,030
	---	35.7	46.5	17.8	4.6	66.8	1.0	5.1	4.8	6,760	12,160
	---	43.4	56.6	---	5.6	81.3	1.2	6.2	5.8	8,220	14,800
w199692	1.0	35.0	42.5	21.5	4.8	63.9	.9	7.1	1.8	6,460	11,620
	---	35.4	42.9	21.7	4.7	64.5	.9	6.3	1.8	6,520	11,740
	---	45.2	54.8	---	6.1	82.5	1.2	8.0	2.3	8,330	15,000
w199693	1.0	19.0	72.1	7.9	4.6	80.5	1.2	3.8	1.9	7,840	14,110
	---	19.2	72.8	8.0	4.5	81.3	1.2	2.9	1.9	7,920	14,250
	---	20.9	79.1	---	4.9	88.4	1.3	3.2	2.1	8,600	15,490
w199694	1.4	24.5	67.3	6.8	4.9	80.7	1.3	5.6	.7	7,860	14,150
	---	24.8	68.3	6.9	4.8	81.8	1.3	4.4	.7	7,970	14,350
	---	26.7	73.3	---	5.2	87.9	1.4	4.7	.8	8,560	15,410
w199695	2.3	26.5	63.4	7.8	5.0	78.4	1.3	6.4	1.1	7,720	13,890
	---	27.1	64.9	8.0	4.9	80.2	1.3	4.5	1.1	7,900	14,210
	---	29.5	70.5	---	5.3	87.2	1.4	4.8	1.2	8,580	15,450

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w199683	2.1	0.01	0.01	0.44	3.0	1,600	1,600G	1,600G
	---	.01	.01	.46				
	---	.01	.01	.49				
w199684	.1	.12	1.74	.46	1.5	1,460	1,525	1,600
	---	.12	1.76	.47				
	---	.19	2.80	.74				
w199685	.1	.58	6.53	1.11	6.0	1,140	1,200	1,425
	---	.59	6.60	1.12				
	---	.77	8.70	1.48				
w199686	.7	.19	1.24	.48	8.5	1,230	1,380	1,500
	---	.19	1.27	.49				
	---	.21	1.40	.54				
w199687	.1	.12	1.38	.10	2.5	1,600	1,600G	1,600G
	---	.12	1.40	.10				
	---	.16	1.80	.13				
w199689	.2	.02	.01	.49	8.5	1,600	1,600G	1,600G
	---	.02	.01	.50				
	---	.02	.01	.55				
w199690	.2	.38	1.77	.85	2.0	1,350	1,375	1,525
	---	.39	1.80	.87				
	---	.61	2.82	1.35				
w199691	.2	.23	4.21	.27	5.5	1,075	1,105	1,210
	---	.23	4.26	.27				
	---	.28	5.18	.33				
w199692	.1	.04	.69	1.04	4.0	1,600	1,600G	1,600G
	---	.04	.70	1.05				
	---	.05	.89	1.34				
w199693	.0	.19	1.10	.65	9.0	1,230	1,280	1,410
	---	.19	1.11	.66				
	---	.21	1.21	.71				
w199694	.0	.03	.25	.41	8.5	1,600	1,600G	1,600G
	---	.03	.25	.42				
	---	.03	.27	.45				
w199695	1.0	.14	.34	.66	9.0	1,530	1,600	1,600G
	---	.14	.35	.68				
	---	.16	.38	.73				

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

		Proximate Analysis			Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w199696	0.9	25.1	64.8	9.2	4.7	76.7	1.3	3.7	4.4	7,630	13,730
	---	25.3	65.4	9.3	4.6	77.4	1.3	2.9	4.4	7,700	13,860
	---	27.9	72.1	---	5.1	85.3	1.4	3.2	4.9	8,490	15,270
w199697	1.2	37.3	48.0	13.5	4.7	66.0	1.3	4.4	10.0	6,910	12,430
	---	37.8	48.6	13.7	4.6	66.8	1.3	3.4	10.1	6,990	12,580
	---	43.7	56.3	---	5.4	77.4	1.5	3.9	11.7	8,100	14,570
w199698	1.3	35.0	44.4	19.3	4.7	61.4	1.0	3.9	9.8	6,320	11,370
	---	35.5	45.0	19.6	4.6	62.2	1.0	2.8	9.9	6,400	11,520
	---	44.1	55.9	---	5.7	77.3	1.3	3.5	12.3	7,960	14,320
w199703	1.6	26.5	63.1	8.8	5.0	77.8	1.5	5.8	1.2	7,690	13,840
	---	26.9	64.1	8.9	4.9	79.1	1.5	4.4	1.2	7,810	14,060
	---	29.6	70.4	---	5.4	86.8	1.7	4.9	1.3	8,580	15,450
w199704	2.2	44.2	46.3	7.3	5.7	72.4	1.3	8.9	4.3	7,440	13,390
	---	45.2	47.3	7.5	5.6	74.0	1.3	7.1	4.4	7,610	13,700
	---	48.8	51.2	---	6.0	80.0	1.4	7.7	4.8	8,220	14,800
w199705	1.0	25.6	48.9	24.5	4.0	59.5	1.1	3.7	7.2	6,090	10,960
	---	25.9	49.4	24.7	3.9	60.1	1.1	2.8	7.3	6,150	11,070
	---	34.4	65.6	---	5.2	79.9	1.5	3.8	9.7	8,170	14,710
w199706	2.9	40.7	49.3	7.1	5.6	72.4	.0	11.5	3.4	7,420	13,350
	---	41.9	50.8	7.3	5.4	74.6	.0	9.2	3.5	7,640	13,750
	---	45.2	54.8	---	5.9	80.4	.0	9.9	3.8	8,240	14,830
w199707	2.3	26.9	62.6	8.2	5.1	77.4	1.3	7.2	.7	7,590	13,660
	---	27.5	64.1	8.4	5.0	79.2	1.3	5.3	.7	7,770	13,980
	---	30.1	69.9	---	5.4	86.5	1.5	5.8	.8	8,480	15,260
w199708	2.0	17.1	39.1	41.8	3.6	45.9	1.0	5.8	2.0	4,560	8,210
	---	17.4	39.9	42.7	3.4	46.8	1.0	4.1	2.0	4,660	8,380
	---	30.4	69.6	---	6.0	81.7	1.8	7.2	3.6	8,120	14,610
w199709	6.2	24.2	60.7	8.9	4.9	72.9	1.3	11.4	.5	7,000	12,600
	---	25.8	64.7	9.5	4.5	77.7	1.4	6.3	.5	7,460	13,430
	---	28.5	71.5	---	5.0	85.9	1.5	6.9	.6	8,240	14,840
w199710	9.6	22.8	63.5	4.1	4.9	72.6	1.4	16.4	.6	6,860	12,340
	---	25.2	70.2	4.5	4.2	80.3	1.5	8.7	.7	7,590	13,650
	---	26.4	73.6	---	4.4	84.1	1.6	9.1	.7	7,950	14,300
w199711	1.3	30.5	59.6	8.6	5.2	77.8	1.4	5.5	1.6	7,680	13,830
	---	30.9	60.4	8.7	5.1	78.8	1.4	4.4	1.6	7,790	14,010
	---	33.9	66.1	---	5.6	86.3	1.6	4.8	1.8	8,530	15,350

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and [illegible] determinations for 132 bituminous coal samples from Pennsylvania--continued

Sample number	Air-dried loss	Forms of sulfur Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C Initial deform.	soften.	fluid
w199696	0.1	0.31	2.90	1.17	9.0	1,140	1,170	1,290
	---	.31	2.93	1.18				
	---	.34	3.23	1.30				
w199697	.0	.33	7.69	1.96	7.5	1,250	1,270	1,300
	---	.33	7.78	1.98				
	---	.39	9.02	2.30				
w199698	.0	.42	7.55	1.81	7.0	1,175	1,200	1,260
	---	.43	7.65	1.83				
	---	.53	9.51	2.28				
w199703	.6	.01	.52	.65	9.0	1,600	1,600G	1,600G
	---	.01	.53	.66				
	---	.01	.58	.73				
w199704	.6	.16	2.59	1.54	4.5	1,095	1,155	1,215
	---	.16	2.65	1.57				
	---	.18	2.86	1.70				
w199705	.3	.15	6.62	.48	8.0	1,180	1,235	1,290
	---	.15	6.69	.48				
	---	.20	8.89	.64				
w199706	.9	.10	2.20	1.07	6.0	1,125	1,180	1,235
	---	.10	2.27	1.10				
	---	.11	2.44	1.19				
w199707	.9	.02	.08	.58	8.0	1,600	1,600G	1,600G
	---	.02	.08	.59				
	---	.02	.09	.65				
w199708	.9	.22	1.58	.24	1.0	0	0	0
	---	.22	1.61	.24				
	---	.39	2.81	.43				
w199709	2.5	.01	.04	.46	2.0	1,405	1,510	1,600
	---	.01	.04	.49				
	---	.01	.05	.54				
w199710	4.7	.01	.02	.59	.50	1,600	1,600G	1,600G
	---	.01	.02	.65				
	---	.01	.02	.68				
w199711	.0	.10	.87	.61	9.0	1,260	1,345	1,600
	---	.10	.88	.62				
	---	.11	.97	.68				

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
W199712	2.8	35.1	47.6	14.5	5.0	67.5	1.4	9.2	2.4	6,680	12,030
	---	36.1	49.0	14.9	4.8	69.4	1.4	6.9	2.5	6,880	12,380
	---	42.4	57.6	---	5.7	81.6	1.7	8.1	2.9	8,080	14,550
W199713	1.5	26.5	66.5	5.5	5.0	81.7	1.4	5.3	1.0	7,990	14,380
	---	26.9	67.5	5.6	4.9	82.9	1.4	4.0	1.0	8,110	14,600
	---	28.5	71.5	---	5.2	87.8	1.5	4.3	1.1	8,590	15,460
W199714	3.2	37.1	55.4	4.3	5.6	76.7	1.7	9.8	1.9	7,620	13,710
	---	38.3	57.2	4.4	5.4	79.2	1.8	7.2	2.0	7,870	14,160
	---	40.1	59.9	---	5.7	82.9	1.8	7.5	2.1	8,230	14,820
W199715	3.6	36.6	55.7	4.1	5.4	75.7	1.6	10.9	2.3	7,470	13,450
	---	38.0	57.8	4.3	5.2	78.5	1.7	8.0	2.4	7,750	13,950
	---	39.7	60.3	---	5.4	82.0	1.7	8.3	2.5	8,100	14,570
W199716	2.3	32.0	58.6	7.1	5.2	76.8	1.4	6.1	3.4	7,650	13,760
	---	32.8	60.0	7.3	5.1	78.6	1.4	4.2	3.5	7,830	14,090
	---	35.3	64.7	---	5.5	84.8	1.5	4.5	3.8	8,440	15,190
W199729	2.1	25.3	65.7	6.9	5.0	78.8	1.4	4.3	3.6	7,740	13,940
	---	25.8	67.1	7.0	4.9	80.5	1.4	2.5	3.7	7,910	14,240
	---	27.8	72.2	---	5.2	86.6	1.5	2.7	4.0	8,510	15,320
W199730	1.6	26.5	69.1	2.8	5.4	84.5	1.6	5.0	.7	8,350	15,040
	---	26.9	70.2	2.8	5.3	85.9	1.6	3.6	.7	8,490	15,280
	---	27.7	72.3	---	5.5	88.4	1.7	3.7	.7	8,740	15,730
W199731	4.9	39.4	48.7	7.0	5.7	70.9	1.3	13.4	1.7	7,080	12,750
	---	41.4	51.2	7.4	5.4	74.6	1.4	9.5	1.8	7,450	13,410
	---	44.7	55.3	---	5.9	80.5	1.5	10.3	1.9	8,040	14,480
W199732	2.8	28.3	57.7	11.2	5.0	73.5	1.1	8.2	1.0	7,220	12,990
	---	29.1	59.4	11.5	4.8	75.6	1.1	5.9	1.0	7,430	13,370
	---	32.9	67.1	---	5.5	85.5	1.3	6.6	1.2	8,390	15,110
W199733	3.4	24.8	49.0	22.8	4.6	62.4	.9	8.3	.9	6,080	10,950
	---	25.7	50.7	23.6	4.4	64.6	.9	5.5	.9	6,300	11,330
	---	33.6	66.4	---	5.7	84.6	1.2	7.2	1.2	8,240	14,840
W199734	1.1	18.5	50.0	30.4	3.8	58.9	1.0	4.2	1.6	5,780	10,410
	---	18.7	50.6	30.7	3.7	59.6	1.0	3.3	1.6	5,850	10,530
	---	27.0	73.0	---	5.4	86.0	1.5	4.7	2.3	8,440	15,200
W199735	8.0	22.5	64.5	5.0	5.4	74.6	1.4	12.8	.7	7,290	13,130
	---	24.5	70.1	5.4	4.9	81.1	1.5	6.2	.8	7,930	14,270
	---	25.9	74.1	---	5.2	85.7	1.6	6.5	.8	8,380	15,090

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

Sample number	Air-dried loss	Forms of sulfur: Sulfate	Forms of sulfur: Pyritic	Forms of sulfur: Organic	Free swelling	Ash fusion temperature C: Initial deform.	Ash fusion temperature C: soften.	Ash fusion temperature C: fluid
w199712	0.1	0.06	1.88	0.47	4.5	1,240	1,295	1,455
	---	.06	1.93	.48				
	---	.07	2.27	.57				
w199713	.3	.05	.21	.78	9.0	1,340	1,410	1,600
	---	.05	.21	.79				
	---	.05	.23	.84				
w199714	.3	.07	1.17	.67	6.0	1,140	1,290	1,395
	---	.07	1.21	.69				
	---	.08	1.26	.72				
w199715	.3	.14	1.51	.63	5.0	1,140	1,165	1,300
	---	.15	1.57	.65				
	---	.15	1.64	.68				
w199716	.4	.26	2.08	1.06	9.0	1,130	1,155	1,175
	---	.27	2.13	1.08				
	---	.29	2.30	1.17				
w199729	.9	.01	2.67	.93	9.0	1,125	1,180	1,235
	---	.01	2.73	.95				
	---	.01	2.93	1.02				
w199730	.5	.01	.06	.62	9.0	1,600	1,600G	1,600G
	---	.01	.06	.63				
	---	.01	.06	.65				
w199731	1.9	.01	.09	1.65	1.5	1,240	1,290	1,345
	---	.01	.09	1.74				
	---	.01	.10	1.87				
w199732	1.3	.01	.29	.69	8.0	1,600	1,600G	1,600G
	---	.01	.30	.71				
	---	.01	.34	.80				
w199733	2.1	.01	.21	.72	6.5	1,600	1,600G	1,600G
	---	.01	.22	.75				
	---	.01	.28	.98				
w199734	.3	.01	1.31	.33	2.0	1,490	1,545	1,595
	---	.01	1.32	.33				
	---	.01	1.91	.48				
w199735	5.9	.01	.03	.69	1.0	1,600	1,600G	1,600G
	---	.01	.03	.75				
	---	.01	.03	[illegible]				

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

Sample number	Moisture	Proximate Analysis: Volatile matter	Fixed carbon	Ash	Ultimate Analysis: Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Heat of Combustion: Kcal/kg	Btu/lb
w199736	2.7	27.5	63.0	6.8	5.2	78.4	1.4	6.4	1.9	7,760	13,970
	---	28.3	64.7	7.0	5.0	80.6	1.4	4.1	2.0	7,980	14,360
	---	30.4	69.6	---	5.4	86.6	1.5	4.4	2.1	8,570	15,430
w199737	.6	18.6	62.1	18.7	4.1	72.6	1.1	3.0	.6	6,970	12,540
	---	18.7	62.5	18.8	4.1	73.0	1.1	2.5	.6	7,010	12,620
	---	23.0	77.0	---	5.0	90.0	1.4	3.1	.7	8,630	15,540
w199738	1.1	24.6	71.5	2.8	5.0	85.6	1.5	4.5	.6	8,360	15,050
	---	24.9	72.3	2.8	4.9	86.6	1.5	3.6	.6	8,460	15,220
	---	25.6	74.4	---	5.1	89.1	1.6	3.7	.6	8,700	15,660
w199739	2.9	37.7	47.7	11.7	5.2	68.0	1.4	10.7	3.0	6,840	12,320
	---	38.8	49.1	12.0	5.0	70.0	1.4	8.4	3.1	7,050	12,680
	---	44.1	55.9	---	5.7	79.6	1.6	9.5	3.5	8,010	14,420
w199740	2.0	40.7	44.8	12.5	5.0	66.3	1.1	9.3	5.9	6,840	12,310
	---	41.5	45.7	12.8	4.9	67.7	1.1	7.7	6.0	6,980	12,560
	---	47.6	52.4	---	5.6	77.5	1.3	8.8	6.9	8,000	14,400
w201274	1.6	42.5	43.7	12.2	5.3	69.8	1.2	9.0	2.6	7,040	12,670
	---	43.2	44.4	12.4	5.2	70.9	1.2	7.7	2.6	7,150	12,880
	---	49.3	50.7	---	5.9	81.0	1.4	8.8	3.0	8,170	14,700
w201275	1.5	44.6	42.6	11.3	5.3	68.2	1.1	7.8	6.2	7,060	12,700
	---	45.3	43.2	11.5	5.2	69.2	1.1	6.6	6.3	7,160	12,900
	---	51.1	48.9	---	5.9	78.2	1.3	7.4	7.1	8,090	14,570
w201276	1.7	27.7	61.5	9.1	4.8	76.6	1.2	5.8	2.4	7,550	13,580
	---	28.2	62.6	9.3	4.7	77.9	1.2	4.4	2.4	7,680	13,820
	---	31.1	68.9	---	5.2	85.9	1.3	4.8	2.7	8,460	15,230
w201277	1.2	32.6	51.8	14.4	4.8	70.4	1.2	7.7	1.6	7,010	12,610
	---	33.0	52.4	14.6	4.7	71.3	1.2	6.7	1.6	7,090	12,770
	---	38.6	61.4	---	5.5	83.4	1.4	7.9	1.9	8,300	14,950
w201278	1.1	36.7	52.9	9.3	5.1	73.9	1.2	5.6	4.8	7,430	13,380
	---	37.1	53.5	9.4	5.0	74.7	1.2	4.7	4.9	7,520	13,530
	---	41.0	59.0	---	5.6	82.5	1.3	5.2	5.4	8,300	14,940
w201279	1.5	8.9	65.3	24.3	3.3	67.2	.8	3.9	.6	6,150	11,070
	---	9.0	66.3	24.7	3.2	68.2	.8	2.6	.6	6,250	11,240
	---	12.0	88.0	---	4.2	90.6	1.1	3.5	.8	8,290	14,930
w201280	2.7	8.7	77.0	11.6	3.5	78.3	1.0	5.0	.5	7,200	12,960
	---	8.9	79.1	11.9	3.3	80.5	1.0	2.7	.5	7,400	13,320
	---	10.2	89.8	---	3.7	91.4	1.2	3.0	.6	8,400	15,120

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w199736	1.4	0.01	1.02	0.84	9.0	1,180	1,235	1,290
	---	.01	1.05	.86				
	---	.01	1.13	.93				
w199737	.1	.03	.16	.39	1.5	1,600	1,600G	1,600G
	---	.03	.16	.39				
	---	.04	.20	.48				
w199738	.3	.03	.02	.55	9.0	1,600	1,600G	1,600G
	---	.03	.02	.56				
	---	.03	.02	.57				
w199739	.3	.19	1.65	1.19	4.0	1,350	1,415	1,530
	---	.20	1.70	1.23				
	---	.22	1.93	1.39				
w199740	.1	.39	3.76	1.72	5.0	1,190	1,240	1,310
	---	.40	3.84	1.76				
	---	.46	4.40	2.01				
w201274	.2	.03	.44	2.13	6.5	1,600	1,600G	1,600G
	---	.03	.45	2.16				
	---	.03	.51	2.47				
w201275	.1	.25	4.15	1.83	6.0	1,115	1,145	1,175
	---	.25	4.21	1.86				
	---	.29	4.76	2.10				
w201276	.4	.16	1.65	.62	8.5	1,140	1,195	1,375
	---	.16	1.68	.63				
	---	.18	1.85	.70				
w201277	.0	.02	.69	.84	8.0	1,600	1,600G	1,600G
	---	.02	.70	.85				
	---	.02	.82	1.00				
w201278	.0	.12	3.56	1.11	8.5	1,125	1,155	1,365
	---	.12	3.60	1.12				
	---	.13	3.97	1.24				
w201279	.4	.04	.05	.53	.0	1,600	1,600G	1,600G
	---	.04	.05	.54				
	---	.05	.07	.71				
w201280	1.2	.03	.01	.45	.0	1,600	1,600G	1,600G
	---	.03	.01	.46				
	[illegible]	[illegible]	[illegible]	[illegible]				

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

Sample number	Moisture	Proximate Analysis: Volatile matter	Fixed carbon	Ash	Ultimate Analysis: Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Heat of Combustion: Kcal/kg	Btu/lb
w201281	1.1	18.6	68.2	12.1	4.3	77.7	1.0	4.3	0.6	7,400	13,330
	---	18.8	69.0	12.2	4.2	78.6	1.0	3.4	.6	7,490	13,480
	---	21.4	78.6	---	4.8	89.5	1.2	3.8	.7	8,530	15,350
w201282	2.6	19.0	70.8	7.6	4.5	80.9	1.0	5.4	.6	7,740	13,930
	---	19.5	72.7	7.8	4.3	83.1	1.0	3.2	.6	7,940	14,300
	---	21.2	78.8	---	4.7	90.1	1.1	3.4	.7	8,620	15,510
w201283	.7	18.6	64.0	16.7	4.1	73.3	1.1	3.9	.9	6,980	12,560
	---	18.7	64.5	16.8	4.1	73.8	1.1	3.3	.9	7,030	12,650
	---	22.5	77.5	---	4.9	88.7	1.3	4.0	1.1	8,450	15,200
w201284	1.1	17.2	67.4	14.3	4.1	74.7	1.1	2.9	2.9	7,210	12,970
	---	17.4	68.1	14.5	4.0	75.5	1.1	1.9	2.9	7,290	13,120
	---	20.3	79.7	---	4.7	88.3	1.3	2.3	3.4	8,520	15,340
w201285	.9	17.9	72.9	8.3	4.4	80.1	1.4	2.6	3.1	7,810	14,050
	---	18.1	73.6	8.4	4.3	80.8	1.4	1.8	3.1	7,880	14,180
	---	19.7	80.3	---	4.7	88.2	1.5	2.0	3.4	8,600	15,470
w201286	1.6	19.5	72.2	6.7	4.6	81.9	1.4	4.8	.7	7,900	14,220
	---	19.8	73.4	6.8	4.5	83.2	1.4	3.4	.7	8,030	14,450
	---	21.3	78.7	---	4.8	89.3	1.5	3.7	.8	8,620	15,510
w201287	1.4	19.9	73.0	5.7	4.7	83.2	1.4	4.2	.8	8,000	14,410
	---	20.2	74.0	5.8	4.6	84.4	1.4	3.0	.8	8,120	14,610
	---	21.4	78.6	---	4.9	89.6	1.5	3.2	.9	8,620	15,510
w200449	1.8	20.7	59.8	17.7	4.4	68.5	1.1	3.9	4.4	1,190	2,140
	---	21.1	60.9	18.0	4.3	69.8	1.1	2.3	4.5	1,210	2,180
	---	25.7	74.3	---	5.2	85.1	1.4	2.9	5.5	1,480	2,660
w200450	1.4	21.3	65.0	12.3	4.8	74.7	1.2	3.9	3.1	7,360	13,240
	---	21.6	65.9	12.5	4.7	75.8	1.2	2.7	3.1	7,460	13,430
	---	24.7	75.3	---	5.4	86.6	1.4	3.1	3.6	8,520	15,340
w200451	1.3	23.6	57.1	18.0	4.5	69.5	1.1	4.7	2.3	6,810	12,270
	---	23.9	57.9	18.2	4.4	70.4	1.1	3.6	2.3	6,900	12,430
	---	29.2	70.8	---	5.4	86.1	1.4	4.4	2.9	8,440	15,200
w196592	4.1	26.1	42.2	27.6	4.2	55.9	1.2	10.3	.9	5,430	9,770
	---	27.2	44.0	28.8	3.9	58.3	1.3	6.9	.9	5,660	10,190
	---	38.2	61.8	---	5.5	81.8	1.8	9.7	1.3	7,950	14,310
w196593	4.1	25.3	42.5	28.1	4.2	56.0	1.1	9.9	.6	5,440	9,800
	---	26.4	44.3	29.3	3.9	58.4	1.1	6.5	.6	5,680	10,220
	---	37.3	62.7	---	5.5	82.6	1.6	9.2	.9	8,030	14,450

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

Sample number	Air-dried loss	Forms of sulfur: Sulfate	Forms of sulfur: Pyritic	Forms of sulfur: Organic	Free swelling	Ash fusion temperature C: Initial deform.	Ash fusion temperature C: soften.	Ash fusion temperature C: fluid
w201281	0.3	0.05	0.02	0.56	3.5	1,600	1,600G	1,600G
	---	.05	.02	.57				
	---	.06	.02	.65				
w201282	1.7	.07	.02	.52	7.0	1,600	1,600G	1,600G
	---	.07	.02	.53				
	---	.08	.02	.58				
w201283	.0	.01	.32	.54	2.5	1,600	1,600G	1,600G
	---	.01	.32	.54				
	---	.01	.39	.65				
w201284	.2	.18	2.09	.63	6.5	1,305	1,330	1,445
	---	.18	2.11	.64				
	---	.21	2.47	.74				
w201285	.1	.09	2.29	.70	9.0	1,175	1,255	1,420
	---	.09	2.31	.71				
	---	.10	2.52	.77				
w201286	.7	.01	.08	.58	8.5	1,600	1,600G	1,600G
	---	.01	.08	.59				
	---	.01	.09	.63				
w201287	.5	.03	.16	.64	9.0	1,600	1,600G	1,600G
	---	.03	.16	.65				
	---	.03	.17	.69				
w200449	.7	.14	3.47	.80	8.5	1,160	1,220	1,290
	---	.14	3.53	.81				
	---	.17	4.31	.99				
w200450	.5	.02	1.88	1.20	9.0	1,320	1,370	1,440
	---	.02	1.91	1.22				
	---	.02	2.18	1.39				
w200451	.4	.02	1.61	.66	7.5	1,515	1,540	1,540
	---	.02	1.63	.67				
	---	.02	2.00	.82				
w196592	1.0	.01	.53	.32	1.0	1,355	1,415	1,490
	---	.01	.55	.33				
	---	.01	.78	.47				
w196593	1.0	.01	.23	.34	1.0	1,440	1,480	1,530
	---	.01	.24	.35				
	---	.01	.34	.50				

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

Sample number	Moisture	Proximate Analysis: Volatile matter	Fixed carbon	Ash	Ultimate Analysis: Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Heat of Combustion: Kcal/kg	Btu/lb
w196594	7.4	34.2	49.3	9.1	5.8	69.2	1.4	13.8	0.7	6,900	12,420
	---	36.9	53.2	9.8	5.4	74.7	1.5	7.8	.8	7,450	13,410
	---	41.0	59.0	---	6.0	82.9	1.7	8.6	.8	8,260	14,880

Table 5e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 132 bituminous coal samples from Pennsylvania--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
W196594	5.0	0.03	0.07	0.58	2.0	1,540	1,540	1,540
	---	.03	.08	.63				
	---	.04	.08	.69				

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania.

[Values in percent or parts-per-million. Coal ashed at 525 C. L means less than the value shown; N, not detected; B, not determined; S after element title indicates determinations by automatic plate reading computer assisted, emission spectographic analyses. The standard deviation of any single answer should be taken as plus 50% and minus 35%. Methods of analyses for other elements as shown in figure 1.]

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w199581	24.8	46	26	0.63	0.88	0.22	2.8	16	1.6	0.05	w199581
w199582	12.2	51	27	.70	.60	.22	2.0	14	1.1	.02	w199582
w199583	9.4	20	14	1.4	.45	.14	.81	58	.40	.01	w199583
w199584	8.7	49	36	.99	.36	.15	1.4	5.3	1.4	.08	w199584
w199585	14.5	59	28	.64	.66	.19	2.2	4.1	1.3	.02	w199585
w199586	8.6	41	30	4.4	1.3	.47	2.3	7.1	.80	.01	w199586
w199587	10.9	51	29	.78	.63	.12	2.1	11	1.1	.01	w199587
w199588	3.5	40	24	7.6	2.0	.39	1.6	6.1	1.1	.01	w199588
w199589	10.9	53	25	.74	.50	.25	1.7	14	1.2	.01	w199589
w199590	10.9	41	21	1.3	.51	.25	1.2	28	1.6	.03	w199590
w199591	10.9	51	27	1.1	.95	.25	2.6	12	1.1	.03	w199591
w199592	14.3	55	28	.64	.68	.19	2.4	8.3	1.4	.02	w199592
w199593	8.6	50	34	1.3	.63	.16	2.1	4.7	1.3	.02	w199593
w199594	16.7	29	17	.80	.43	.24	1.7	47	.87	.02	w199594
w199595	4.7	37	31	3.9	1.3	.29	2.5	12	1.4	.01	w199595
w199596	11.4	53	36	.77	.33	.12	1.4	1.2	1.8	.01	w199596
w199597	8.2	42	22	1.4	.40	.16	.83	26	1.3	.02	w199597
w199598	6.2	48	34	1.6	.85	.22	2.4	5.6	1.5	.01	w199598
w199599	13.2	41	22	.84	.61	.31	2.6	27	1.1	.03	w199599
w199600	8.7	34	26	1.4	.46	.15	1.1	30	1.3	.02	w199600
w199601	6.4	20	14	1.7	.51	.21	.71	57	.56	.01	w199601
w199602	20.2	48	38	.39	.61	.27	3.5	3.4	1.8	.02	w199602
w199603	11.6	52	38	.81	.48	.12	2.3	1.6	1.7	.01	w199603
w199604	4.3	43	26	1.8	.83	.31	1.4	17	.80	.02	w199604
w199605	16.6	43	24	1.2	.50	.16	1.4	20	1.2	.25	w199605
w199606	14.3	52	26	1.0	.90	.19	3.1	7.5	1.2	.13	w199606
w199607	7.0	41	38	1.5	.36	.19	.87	9.3	.86	.01	w199607
w199608	10.7	47	30	1.2	1.3	.25	4.2	9.0	.99	.03	w199608
w199609	10.3	55	29	1.8	.71	1.1	2.1	3.5	2.0	.08	w199609
w199610	14.9	49	27	.79	.68	.18	2.8	13	1.5	.03	w199610
w199611	12.8	47	29	.64	.65	.21	2.5	14	1.3	.01	w199611
w199612	16.9	46	25	.78	.83	.24	2.9	18	1.2	.07	w199612
w199613	8.9	46	24	.79	.81	.30	2.8	19	1.2	.02	w199613
w199614	12.8	46	25	.97	.66	.21	2.0	19	1.5	.01	w199614
w199717	9.7	51	32	1.9	.66	.28	2.1	2.9	1.8	.07	w199717
w199718	10.6	38	25	3.8	.95	.25	3.1	16	.78	.03	w199718
w199719	8.7	27	13	1.2	.40	.15	1.0	53	1.6	.01	w199719
w199720	11.0	50	31	.96	.55	.25	1.8	7.8	2.1	.03	w199720
w199721	15.8	41	19	.78	.51	.17	1.9	34	.79	.01	w199721
w199722	9.6	9.5	4.9	1.1	.14	.14	.14	81	.26	.01	w199722

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	SO3 (percent)	Ag-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w199581	1.3	0.20	31	810	9.0	0.20	130	23	130	13	w199581
w199582	.94	.30	28	280	11	.74	160	150	150	12	w199582
w199583	2.1	.30	10L	310	32	.94	130	63	65	3.2	w199583
w199584	.62	.30	51	590	13	.18	230	23	240	5.7	w199584
w199585	.70	.60	48	240	10	1.2	160	50	170	13	w199585
w199586	8.3	1.1	49	1,100	88	3.8	470	140	220	7.0	w199586
w199587	1.1	.30	38	300	13	.70	160	77	160	11	w199587
w199588	14	1.3	39	1,500	150	1.3	170	130	140	5.7	w199588
w199589	1.0	.50	37	200	14	.82	150	67	150	8.3	w199589
w199590	1.9	.30	20	330	18	.53	180	56	140	3.7	w199590
w199591	1.5	.40	46	390	31	.15	170	100	110	7.3	w199591
w199592	.87	.60	48	450	27	.68	140	71	190	13	w199592
w199593	1.7	.20	110	950	19	.38	120	84	230	9.3	w199593
w199594	1.3	.40	17	200	14	.51	96	100	100	4.8	w199594
w199595	7.6	1.4	55	1,400	36	4.8	110	98	190	6.4	w199595
w199596	1.0	.30	52	410	12	.14	190	56	190	5.3	w199596
w199597	2.0	.70	35	230	25	.72	160	110	160	3.7	w199597
w199598	2.5	.10	63	320	25	.40	160	45	230	13	w199598
w199599	1.3	.30	29	470	21	.32	180	39	120	9.8	w199599
w199600	2.0	.40	35	190	19	.34	210	25	160	5.7	w199600
w199601	2.7	.50	10L	290	27	.76	78	130	58	4.7	w199601
w199602	.44	2.4	48	400	19	1.7	230	170	230	16	w199602
w199603	.90	.40	37	370	33	.14	230	120	170	14	w199603
w199604	2.9	1.2	500	320	68	4.6	350	100	180	9.3	w199604
w199605	1.1	.40	180	880	17	.42	190	29	130	5.4	w199605
w199606	1.5	.10L	180	2,400	29	.19	290	45	140	13	w199606
w199607	1.7	.50	200	140	32	2.7	230	190	210	4.3	w199607
w199608	1.3	.10L	150	380	32	.52	170	270	160	10	w199608
w199609	2.1	.10L	160	760	15	.39	190	39	170	8.7	w199609
w199610	1.0	.40	49	520	32	.89	160	42	180	13	w199610
w199611	.75	.20	38	330	15	.50	210	45	190	14	w199611
w199612	.92	.30	37	520	16	.62	170	82	170	12	w199612
w199613	1.1	.30	41	700	14	.42	160	61	170	12	w199613
w199614	1.2	.70	45	250	19	1.3	150	55	160	12	w199614
w199717	2.0	.20	79	730	22	.84	330	47	180	9.3	w199717
w199718	5.6	.50	69	730	19	.18	130	39	140	14	w199718
w199719	1.6	.60	24	210	23	.68	100	100	140	6.9	w199719
w199720	1.1	.20	54	900	25	.24	250	56	180	9.1	w199720
w199721	.89	.10L	37	180	12	.40	100	46	85	5.7	w199721
w199722	1.6	.70	100	45	19	.60	83	59	61	16L	w199722

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Ho-S (ppm)	La (ppm)	Sample number
w199581	74	22L	10L	2.0	40	7.0L	40	7.7	7.0L	73	w199581
w199582	120	22L	10L	3.0	32	10	11	6.6	7.0L	82	w199582
w199583	130	22L	10L	4.8	150	18	100	8.5L	7.0L	53	w199583
w199584	56	22L	10L	4.3	36	11	3.0	8.0	7.0L	140	w199584
w199585	140	22L	10L	2.6	37	10	44	6.9	7.0L	83	w199585
w199586	500	48	40	15	42	50	19	7.0	15	220	w199586
w199587	120	22L	10L	2.9	30	12	14	6.4	7.0L	92	w199587
w199588	100	43	39	10	240	33	240	8.6	13	86	w199588
w199589	120	22L	10L	3.0	35	9.0	18	5.5	7.0L	83	w199589
w199590	110	22L	10L	2.8	56	11	24	7.3	7.0L	100	w199590
w199591	100	22L	10L	3.3	56	10	37	4.6	7.0L	83	w199591
w199592	140	22L	13	3.4	56	12	39	7.0	7.0L	70	w199592
w199593	170	22L	10L	6.2	59	18	96	7.0	15L	58	w199593
w199594	94	22L	10L	2.3	48	19	48	4.2	7.0L	48	w199594
w199595	750	22L	19	3.0	88	22	34	6.4	15L	64	w199595
w199596	68	22L	10L	2.9	42	16	4.0	8.8	7.0L	110	w199596
w199597	210	22L	10L	3.8	81	7.0L	51	6.1	7.0L	98	w199597
w199598	120	22L	13	5.5	60	13	17	8.1	7.0L	81	w199598
w199599	230	27	13	3.6	60	17	26	5.3	7.0L	110	w199599
w199600	100	22L	10L	4.5	48	20	60	6.9	7.0L	100	w199600
w199601	170	22L	10L	3.8	47	20	57	3.1	7.0L	47	w199601
w199602	620	22L	10L	3.7	69	11	66	10	7.0L	120	w199602
w199603	160	19	11	3.9	52	14	29	7.8	7.0L	130	w199603
w199604	660	28	12	13	150	18	230	4.7	9.0	190	w199604
w199605	120	22L	10L	3.7	39	13	8.0	6.0	7.0L	100	w199605
w199606	83	22L	10L	3.4	58	11	40	6.3	7.0L	150	w199606
w199607	120	25	10L	6.3	82	13	51	4.3	7.0L	140	w199607
w199608	240	26	14	5.4	110	16	62	4.7	7.0	84	w199608
w199609	82	22L	10L	3.0	42	11	17	9.7	7.0L	110	w199609
w199610	160	22L	10L	3.0	60	12	36	7.4	7.0L	87	w199610
w199611	98	22	10L	3.7	45	13	9.0	7.0	7.0L	100	w199611
w199612	100	22L	10L	3.1	55	13	32	5.9	7.0L	95	w199612
w199613	91	22L	10L	2.7	45	9.0	55	6.7	7.0L	79	w199613
w199614	150	22L	10L	16L	51	11	47	7.0	7.0L	78	w199614
w199717	160	22L	14	5.2	45	15L	2.0	10	7.0L	200	w199717
w199718	180	22L	10L	3.8	130	15L	150	5.7	7.0L	75	w199718
w199719	130	22L	10L	6.1	77	15L	33	3.4	7.0L	46	w199719
w199720	140	22L	10L	3.8	52	15L	21	11	7.0L	150	w199720
w199721	68	22L	10L	2.3	32	15L	21	3.2	7.0L	51	w199721
w199722	330	22L	10L	2.0	41	15L	7.0	7.3L	7.0L	31	w199722

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Sample number
w199581	350	1	130	10	14	46L	56	67	68L	190	w199581
w199582	150	2	32	41	13	68	140	55	68L	170	w199582
w199583	71	4	440	41	12	47	99	75	68L	430L	w199583
w199584	230	1	84	25	13	72	58	96	68L	340L	w199584
w199585	170	1	57	33	11	50	110	66	68L	210	w199585
w199586	76	9	680	23	9	200	330	430	68L	470L	w199586
w199587	170	.9	75	45	16	65	120	48	68L	210	w199587
w199588	72	6	610	49	11	84	560	430	68L	860L	w199588
w199589	160	.9	49	56	12	46	120	58	68L	640L	w199589
w199590	150	2	130	5.0	16	52	31	48	68L	640L	w199590
w199591	180	2	130	18	10	76	130	66	68L	550L	w199591
w199592	260	2	60	45	24	64	170	99	68L	490L	w199592
w199593	270	2	1,000	60	17	78	320	95	68L	580L	w199593
w199594	76	1	94	32	10	46L	85	50	68L	420L	w199594
w199595	74	2	510	32	24	48	650	60	68L	850L	w199595
w199596	230	.9	42	9.0	32	110	170	110	68L	440L	w199596
w199597	130	1	84	39	11	53	330	180	68L	730L	w199597
w199598	240	3	180	16	12	75	69	53	68L	810L	w199598
w199599	140	2	120	31	26	79	67	81	68L	530L	w199599
w199600	220	2	77	25	23	84	39	40	68L	570L	w199600
w199601	65	2	220	43	8	46L	110	69	68L	780L	w199601
w199602	380	1	60	24	17	79	270	230	68L	320	w199602
w199603	280	2	52	6.0	17	82	200	160	68L	340L	w199603
w199604	86	5	130	77	8	100	300	180	68L	700L	w199604
w199605	160	1	40	9.0	14	69	130	110	68L	240L	w199605
w199606	190	1	42	8.0	17	94	110	110	68L	170	w199606
w199607	490	3	30	17	11	83	370	63	68L	430L	w199607
w199608	3,300	3	500	9.0	12	78	380	100	68L	240	w199608
w199609	160	2	250	6.0	22	68	47	64	68L	390L	w199609
w199610	270	1	55	11	14	64	120	100	68L	230	w199610
w199611	240	.8	60	52	15	75	89	64	68L	230	w199611
w199612	170	1	86	19	12	46L	130	85	68L	260	w199612
w199613	100	1	87	46	11	46L	150	100	68L	450L	w199613
w199614	160	2	65	17	13	46L	110	150	68L	310L	w199614
w199717	350	2	300	10	18	100	110	100	68L	310L	w199717
w199718	180	3	2,400	14	3	46L	130	260	68L	220	w199718
w199719	43	2	140	85	7	59	110	66	68L	340L	w199719
w199720	380	2	54	15	19	68	140	70	68L	410L	w199720
w199721	76	.6	210	12	8	46L	100	73	68L	280L	w199721
w199722	23	1	570	15	10	46L	110	20L	68L	420L	w199722

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Ta (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	Tm (ppm)	U (ppm)	Sample number
w199581	39	10	2.0L	490	460L	1.2	16	3.0L	5.0L	15	w199581
w199582	30	16	2.0L	310	460L	2.5	25L	3.0L	5.0L	12	w199582
w199583	94	21	9.0	470	460L	6.4	32L	3.0L	5.0L	49	w199583
w199584	54	22	7.0	1,100	460L	3.4	34L	3.0L	5.0L	20	w199584
w199585	37	14	6.0	180	460L	2.1	21L	3.0L	5.0L	39	w199585
w199586	100	73	2.0L	680	460L	15	35L	3.0L	7.0	20	w199586
w199587	30	16	2.0	250	460L	2.8	28L	3.0L	5.0L	12	w199587
w199588	130	34	2.0	2,200	460L	11	86L	3.0L	7.0	26	w199588
w199589	28	15	2.0L	230	460L	2.8	28L	3.0L	5.0L	16	w199589
w199590	37	15	2.0L	1,100	460L	7.3L	28L	3.0L	5.0L	11	w199590
w199591	39	16	2.0L	940	460L	2.8	28L	3.0L	5.0L	16	w199591
w199592	46	14	2.0L	490	460L	2.1	21L	3.0L	5.0L	15	w199592
w199593	47	24	6.0	410	460L	4.7	35L	3.0L	5.0L	15	w199593
w199594	32	9.6	2.0L	120	460L	1.8	18L	58	5.0L	7.8	w199594
w199595	45	13	2.0L	870	460L	4.3	64L	3.0L	5.0L	26	w199595
w199596	33	16	5.0	730	460L	1.8	26L	3.0L	5.0L	14	w199596
w199597	34	16	2.0	830	460L	8.5L	37L	3.0L	5.0L	18	w199597
w199598	47	24	7.0	530	460L	4.8	48L	3.0L	5.0L	24	w199598
w199599	59	16	2.0L	670	460L	3.8	23L	3.0L	5.0L	30	w199599
w199600	37	21	2.0L	410	460L	3.4	34L	3.0L	5.0L	14	w199600
w199601	30	14	2.0L	540	460L	9.4L	47L	3.0L	5.0L	13	w199601
w199602	50	20	9.0	320	460L	2.0	30	4.0	5.0L	24	w199602
w199603	45	22	5.0	660	460L	2.6	26L	3.0L	5.0L	22	w199603
w199604	130	51	2.0L	1,600	460L	9.3	70L	3.0L	5.0L	33	w199604
w199605	26	19	2.0L	3,200	460L	2.4	18L	25	5.0L	9.6	w199605
w199606	31	20	2.0L	2,900	460L	1.4	21L	3.0L	5.0L	9.1	w199606
w199607	41	30	2.0L	700	460L	5.7	43L	3.0L	5.0L	16	w199607
w199608	73	22	2.0	570	460L	4.7	28L	3.0L	5.0L	16	w199608
w199609	41	16	7.0	2,400	460L	1.9	29L	3.0L	5.0L	11	w199609
w199610	36	15	2.0L	840	460L	2.7	20L	3.0L	5.0L	20	w199610
w199611	33	20	2.0L	300	460L	2.3	23L	3.0L	5.0L	13	w199611
w199612	33	15	2.0L	670	460L	1.8	18L	3.0L	5.0L	12	w199612
w199613	33	13	2.0L	400	460L	2.2	34L	16	5.0L	13	w199613
w199614	30	14	2.0L	400	460L	6.3L	23L	3.0L	5.0L	21	w199614
w199717	41	27	9.0	2,300	460L	4.1	31	3.0L	5.0L	6.2	w199717
w199718	75	16	2.0L	440	460L	3.8	28L	3.0L	5.0L	20	w199718
w199719	36	22	2.0L	450	460L	4.6	34L	3.0L	5.0L	3.4	w199719
w199720	41	18	5.0	1,000	460L	2.7	45	3.0L	5.0L	3.6	w199720
w199721	16	10	2.0L	280	460	1.9	19L	3.0L	5.0L	1.9	w199721
w199722	14	9.4	N	290	460L	2.1	31L	3.0L	5.0L	11	w199722

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)
w199581	120	32	7.3	73	110
w199582	140	51	8.2	190	100
w199583	130	100	23	110	38
w199584	340	49	9.2	140	110
w199585	210	35	6.9	240	88
w199586	210	320	49	740	180
w199587	140	66	7.3	220	160
w199588	250	300	34	310	150
w199589	150	43	7.3	190	57
w199590	76	47	9.2	100	150
w199591	180	64	10	92	73
w199592	230	99	11	160	180
w199593	230	150	14	160	180
w199594	75	48	10	46	95
w199595	280	160	17	830	320
w199596	220	85	6.1	90	490
w199597	140	44	7.3	150	79
w199598	200	91	13	210	100
w199599	200	130	15	94	310
w199600	180	100	13	210	250
w199601	47	73	11	130	49
w199602	390	45	7.9	180	120
w199603	320	85	9.5	79	130
w199604	310	120	28	2,500	82
w199605	100	51	7.2	87	110
w199606	140	74	9.1	97	200
w199607	160	100	14	620	94
w199608	220	120	19	220	94
w199609	160	67	8.7	83	170
w199610	180	75	9.4	130	160
w199611	150	58	7.0	160	140
w199612	120	36	7.1	180	65
w199613	110	25	7.9	160	76
w199614	130	33	7.0	240	96
w199717	180	67	10	99	130
w199718	150	33	14	150	70
w199719	89	93	16	200	65
w199720	180	47	10	67	120
w199721	75	37	5.1	190	76
w199722	140	43	5.2	120	48

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w199723	8.9	13	7.2	1.0	0.18	0.15	0.22	75	0.33	0.00	w199723
w199724	9.4	48	39	1.9	.53	.14	1.0	2.9	1.2	.04	w199724
w199725	22.9	32	25	.49	.17	.12	.41	38	.49	.10	w199725
w199726	14.7	38	27	.95	.40	.18	1.3	26	1.3	.07	w199726
w199727	12.1	49	19	.80	.32	.22	1.1	23	2.0	.15	w199727
w199728	4.5	40	29	1.8	.48	.30	.85	21	.98	.01	w199728
w199423	8.2	35	19	5.2	.78	.82	.98	32	.75	.51	w199423
w199424	7.8	45	21	3.9	.98	1.6	1.1	23	1.2	.05	w199424
w199660	17.6	21	9.8	.72	.23	.08	.91	62	.48	.04	w199660
w199661	8.7	24	19	2.0	.25	.15	.35	48	.49	.03	w199661
w199662	12.5	46	20	.77	.63	.22	1.7	26	1.6	.01	w199662
w199663	14.3	39	27	.84	.50	.19	1.3	26	.86	.02	w199663
w199664	20.4	38	20	1.1	.50	.13	1.6	33	.89	.20	w199664
w199665	12.7	43	28	1.7	.58	.32	1.8	18	2.0	.20	w199665
w199666	8.2	53	34	.94	.86	.16	3.1	2.4	1.4	.04	w199666
w199667	9.1	29	22	1.1	.40	.30	.93	43	.71	.03	w199667
w199668	21.2	36	17	.93	.23	.06	1.2	39	1.5	.25	w199668
w199669	13.8	42	24	.58	.46	.20	2.0	27	.98	.02	w199669
w199670	12.5	46	27	.83	.51	.22	2.2	17	1.4	.10	w199670
w199671	13.1	54	28	.49	.66	.21	2.9	8.9	1.5	.03	w199671
w199672	5.8	29	23	1.3	.22	.23	.53	22	.51	.03	w199672
w199673	19.3	51	25	.36	.65	.21	2.7	14	1.3	.04	w199673
w199674	11.6	45	41	.73	.23	.12	1.1	1.8	4.1	.11	w199674
w199675	13.6	56	30	.65	.75	.20	3.1	2.9	1.4	.03	w199675
w199676	11.3	38	27	1.2	.35	.12	1.1	27	.90	.06	w199676
w199677	11.5	44	40	2.0	.22	.12	.67	4.3	4.1	.21	w199677
w199678	5.0	26	18	3.5	.36	.27	.58	45	.70	.02	w199678
w199679	18.4	50	28	.22	.38	.15	1.4	14	2.1	.03	w199679
w199680	9.0	46	30	1.3	.27	.15	.64	15	2.2	.02	w199680
w199681	31.6	36	28	1.4	.22	.09	.58	30	.76	.35	w199681
w199682	11.6	35	23	.89	.38	.23	1.2	35	.74	.04	w199682
w199683	7.2	52	35	1.4	.61	.56	2.3	2.5	1.3	.02	w199683
w199684	43.8	57	26	.16	.73	.15	2.3	9.1	1.1	.10	w199684
w199685	21.2	33	24	.35	.36	.13	.88	39	.51	.08	w199685
w199686	9.1	48	28	.96	.60	.30	2.2	16	1.2	.01	w199686
w199687	20.1	52	29	.47	.51	.13	1.9	11	1.4	.01	w199687
w199689	11.3	55	31	.98	.43	.24	1.6	1.1	1.8	.12	w199689
w199690	37.9	51	26	.32	.96	.21	2.9	12	1.3	.17	w199690
w199691	16.6	47	19	.88	.46	.16	1.6	26	1.7	.04	w199691
w199692	19.9	57	25	.85	.58	.20	2.3	5.1	1.6	.22	w199692

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	SO3 (percent)	Ag-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w199723	1.4	0.90	900	82	46	0.28	67	130	60	11L	w199723
w199724	1.6	2.0	32	470	29	.30	260	34	350	4.3	w199724
w199725	.60	1.0	240	350	8.0	3.0	140	370	210	1.7	w199725
w199726	.82	.70	21	380	11	.78	240	41	250	7.5	w199726
w199727	.39	.50	250	610	22	.37	170	12	160	3.3	w199727
w199728	2.1	1.4	28	240	40	1.4	110	120	150	22L	w199728
w199423	5.1	.10L	500	430	7.0	.75	110	34	110	4.9	w199423
w199424	4.3	.10L	700	750	7.0	.85	100	17	100	6.4	w199424
w199660	2.4	.50	160	130	40	.48	57	28	60	1.7	w199660
w199661	3.9	.80	340	320	12	.88	180	61	120	2.3	w199661
w199662	2.3	.30	360	270	17	.30	72	11	98	7.2	w199662
w199663	2.2	.50	32	190	18	1.3	91	38	150	5.6	w199663
w199664	2.5	.30	46	380	15	.80	170	21	110	6.4	w199664
w199665	2.8	.30	100	700	9.0	.32	150	21	160	7.9	w199665
w199666	2.0	.40	74	870	25	.34	180	150	150	12	w199666
w199667	2.9	.70	43	370	16	1.0	110	31	99	3.3	w199667
w199668	2.6	.30	130	480	21	.18	190	11	140	2.8	w199668
w199669	2.1	.30	44	290	12	.83	100	67	140	5.8	w199669
w199670	2.0	.30	63	1,100	27	.44	170	52	180	6.4	w199670
w199671	1.8	.80	79	500	34	1.3	280	130	300	11	w199671
w199672	2.8	.90	1,800	200	33	.92	160	43	100	5.2	w199672
w199673	1.2	.80	70	440	22	1.8	210	130	210	8.8	w199673
w199674	.70	.70	110	1,100	21	.67	410	61	260	2.6	w199674
w199675	1.1	1.1	88	780	31	.48	210	60	220	13	w199675
w199676	2.1	.50	330	290	26	1.6	450	180	160	6.2	w199676
w199677	.93	.50	100	980	15	.75	390	38	270	1.7	w199677
w199678	5.4	.50	1,500	270	38	.32	120	24	120	2.0	w199678
w199679	.65	.90	51	320	15	.34	150	17	210	8.7	w199679
w199680	2.1	.80	65	350	19	.82	270	180	200	2.2	w199680
w199681	1.9	.60	320	410	15	2.0	130	100	84	2.2	w199681
w199682	1.7	.50	46	280	18	.72	130	120	120	5.2	w199682
w199683	1.8	.20	140	700	29	.38	220	47	150	9.7	w199683
w199684	.80	.30	62	460	12	1.1	170	49	110	6.8	w199684
w199685	1.1	.70	38	360	30	1.0	460	66	210	4.2	w199685
w199686	1.7	.70	86	350	21	.67	160	87	160	9.9	w199686
w199687	.24	.30	71	390	15	.53	130	47	130	12	w199687
w199689	.30	.70	84	1,400	32	.95	290	120	200	8.0	w199689
w199690	.43	.10	88	490	9.0	.22	120	9.8	120	15	w199690
w199691	.78	.20	210	320	32	.14	96	16	96	5.4	w199691
w199692	.52	.20	290	340	12	.10L	380	9.0	140	12	w199692

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Ho-S (ppm)	La (ppm)	Sample number
w199723	130	22L	10L	2.4	110	27	46	7.9L	7.0L	22	w199723
w199724	130	22L	10L	4.3	150	15l	230	6.4	7.0L	180	w199724
w199725	160	22L	10L	1.8	46	15	2.0	3.5	7.0L	83	w199725
w199726	140	22L	10L	4.0	62	15L	9.0	6.8	7.0L	130	w199726
w199727	110	22L	10L	2.9	64	15L	74	8.3	7.0L	99	w199727
w199728	190	22L	10L	2.7	88	15L	69	4.4	7.0L	67	w199728
w199423	58	22L	10L	2.2	27	13	5.0	4.9	7.0L	61	w199423
w199424	66	22L	10L	1.8	32	14	4.0	6.4	7.0L	64	w199424
w199660	50	22L	10L	1.5	57	25	78	2.3	7.0L	28	w199660
w199661	100	22L	10L	3.1	71	24	16	8.0L	7.0L	92	w199661
w199662	42	22L	10L	1.8	47	20	7.0	6.4	7.0L	40	w199662
w199663	95	22L	10L	3.3	50	19	11	4.9	7.0L	35	w199663
w199664	70	22L	10L	3.4	38	20	46	4.4	7.0L	83	w199664
w199665	91	22L	10L	2.8	43	15L	2.0L	7.9	7.0L	87	w199665
w199666	180	22L	13	3.7	74	16	24	6.1	7.0L	98	w199666
w199667	130	22L	10L	2.0	52	20	49	3.3	7.0L	44	w199667
w199668	69	22L	10L	2.8	35	23	13	6.1	7.0L	100	w199668
w199669	80	22L	10L	4.3	51	21	2.0L	4.3	7.0L	36	w199669
w199670	73	22L	10	2.9	84	18	27	6.4	15L	96	w199670
w199671	120	34	18	5.5	120	30	56	8.4	9.0	140	w199671
w199672	140	43	17	6.6	84	33	70	5.2	7.0L	86	w199672
w199673	150	33	16	4.6	110	27	41	6.2	10	100	w199673
w199674	210	22L	17	6.0	95	15L	2.0	19	15L	220	w199674
w199675	95	34	10L	5.1	150	21	51	8.1	15L	120	w199675
w199676	150	41	25	13	55	41	2.0L	5.3	15	190	w199676
w199677	140	22L	12	5.9	87	15L	3.0	20	15L	220	w199677
w199678	110	27	18	5.0	72	28	28	4.0	7.0L	40	w199678
w199679	110	22L	10L	3.2	110	15L	9.0	8.2	7.0L	76	w199679
w199680	190	22L	13	5.0	65	24	14	12	7.0L	130	w199680
w199681	160	22L	10L	1.4	110	22	29	2.5	7.0L	82	w199681
w199682	63	22L	10L	2.6	44	22	18	4.3	7.0L	60	w199682
w199683	37	22L	10L	4.0	79	16	37	6.9	7.0L	110	w199683
w199684	62	22L	10L	2.8	33	15L	27	5.0	7.0L	89	w199684
w199685	110	34	10L	7.0	93	30	170	5.2	7.0L	250	w199685
w199686	98	22L	10L	4.0	65	16	15	6.6	7.0L	66	w199686
w199687	71	22L	10L	2.3	58	16	4.0	7.5	15L	75	w199687
w199689	230	22L	14	4.4	88	17	70	8.8	7.0L	160	w199689
w199690	57	22L	10L	1.7	44	15L	3.0	7.7	7.0L	69	w199690
w199691	62	22L	10L	1.6	35	17	3.0	7.2	7.0L	60	w199691
w199692	100	22L	14	5.7	27	24	2.0L	8.5	7.0L	180	w199692

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Sample number
w199723	44	2	110	46	11	46L	300	360	68L	450L	w199723
w199724	270	2	44	16	9	78	210	62	68L	430L	w199724
w199725	300	1	38	15	6	46L	280	95	68L	240L	w199725
w199726	200	1	71	12	13	61	72	84	67L	310L	w199726
w199727	80	2	150	11	29	46L	61	150	68L	410L	w199727
w199728	130	2L	110	140	9	46L	140	110	68L	890L	w199728
w199423	110	1	270	3.0	6	46L	44	30	68L	520L	w199423
w199424	110	1	180	6.0	14	46L	66	27	68L	640L	w199424
w199660	46	1	1,200	14	28	49	73	180	68L	340L	w199660
w199661	170	1	140	12	11	100	120	52	68L	570L	w199661
w199662	390	.8	76	20	49	64	51	72	68L	400L	w199662
w199663	280	1	140	58	13	73	97	96	68L	420L	w199663
w199664	210	1	170	29	28	110	67	29	68L	340L	w199664
w199665	270	.8	150	10	44	120	51	53	150L	470L	w199665
w199666	220	1	78	130	27	150	300	77	68L	730L	w199666
w199667	190	1	150	74	17	81	120	32	68L	550L	w199667
w199668	190	.9	160	24	43	120	41	210	68L	330L	w199668
w199669	130	1	85	33	18	110	180	37	68L	240	w199669
w199670	140	2	81	24	24	110	270	32	85	560L	w199670
w199671	130	2	76	16	51	180	400	64	100	280	w199671
w199672	230	2	65	96	17	120	170	130	68L	860L	w199672
w199673	120	2	60	16	45	150	440	68	68L	230	w199673
w199674	240	2	43	16	130	190	260	200	68L	520L	w199674
w199675	120	2	390	18	25	150	330	56	68L	510L	w199675
w199676	350	3	280	66	27	250	320	48	160	530L	w199676
w199677	240	3	43	20	80	130	130	120	68L	430L	w199677
w199678	140	2	340	110	23	69	120	180	68L	800L	w199678
w199679	190	2	46	33	36	70	110	58	68L	330L	w199679
w199680	180	1	98	32	95	150	600	100	150L	560L	w199680
w199681	260	.6	70	23	12	100	210	76	68L	220L	w199681
w199682	120	.9	110	32	30	92	300	200	68L	430L	w199682
w199683	150	1	560	30	23	140	140	28	68L	690L	w199683
w199684	200	.9	110	11	28	100	110	54	68L	200	w199684
w199685	290	2	87	55	14	180	330	130	150L	380L	w199685
w199686	130	1	61	22	25	120	160	86	68L	550L	w199686
w199687	220	1	36	10	47	100	86	48	68L	160	w199687
w199689	280	2	34	71	25	150	400	110	68L	350L	w199689
w199690	500	.8	120	2.0L	20	68	44	37	68L	230	w199690
w199691	260	1	130	16	50	69	39	18	150L	240L	w199691
w199692	320	2	76	4.0	55	240	27	32	150L	190	w199692

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Ta (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	Tm (ppm)	U (ppm)	Sample number
w199723	17	10	24	290	460L	2.2	34L	3.0L	5.0L	2.2L	w199723
w199724	67	19	10	1,200	460L	4.3	43	13	5.0L	12	w199724
w199725	34	9.2	2.0L	1,400	460L	2.6	26	65	5.0L	5.7	w199725
w199726	52	18	2.0	1,100	460L	2.7	27	3.0L	5.0L	8.2	w199726
w199727	39	14	3.0	4,700	460L	2.5	50	3.0L	5.0L	5.8	w199727
w199728	29	11	3.0	670	460L	6.7L	67L	3.0L	5.0L	20	w199728
w199423	23	11	2.0L	1,300	460L	1.2	37L	3.0L	5.0L	2.4L	w199423
w199424	21	9.0	2.0L	1,500	460L	7.7L	38L	3.0L	5.0L	2.6L	w199424
w199660	27	6.3	N	440	460L	2.3	17L	3.0L	5.0L	6.8	w199660
w199661	32	11	N	1,000	460L	2.3	34L	3.0L	5.0L	2.3L	w199661
w199662	20	8.0	2.0L	390	460L	4.8L	24L	3.0L	5.0L	1.6	w199662
w199663	35	13	2.0L	270	460L	2.8	21L	3.0L	5.0L	6.3	w199663
w199664	28	14	2.0L	1,800	460L	2.0	29	3.0L	5.0L	12	w199664
w199665	33	13	2.0L	4,700	460L	2.4	31	3.0L	5.0L	6.3	w199665
w199666	35	16	6.0	1,600	460L	2.4	37L	3.0L	5.0L	2.4	w199666
w199667	30	8.8	2.0L	1,300	460L	6.6L	33L	3.0L	5.0L	3.3	w199667
w199668	32	13	2.0L	3,300	460L	1.4	19	3.0L	5.0L	8.5	w199668
w199669	25	17	2.0L	290	460L	2.9	22L	3.0L	5.0L	2.2	w199669
w199670	39	14	2.0L	2,200	460L	2.4	24L	3.0L	5.0L	2.4	w199670
w199671	86	26	2.0L	450	460L	4.6	23L	3.0L	5.0L	7.6	w199671
w199672	26	19	N	2,200	460L	6.9	52L	3.0L	5.0L	3.4L	w199672
w199673	58	18	2.0L	610	460L	4.1	26	3.0L	5.0L	7.3	w199673
w199674	59	27	17	1,600	460L	4.3	69	3.0L	10L	15	w199674
w199675	69	19	12	800	460L	5.1	22L	3.0L	5.0L	8.8	w199675
w199676	27	51	2.0L	1,600	460L	8.0	27L	3.0L	5.0L	6.2	w199676
w199677	51	26	11	1,600	460L	4.3	61	3.0L	5.0L	12	w199677
w199678	24	18	N	1,200	460L	4.0	60L	3.0L	5.0L	4.0L	w199678
w199679	41	13	2.0L	240	460L	2.7	49	3.0L	5.0L	9.2	w199679
w199680	42	23	2.0L	1,100	460L	4.4	33L	3.0L	5.0L	6.7	w199680
w199681	21	6.6	2.0L	2,900	460L	2.5L	16	3.0L	5.0L	2.8	w199681
w199682	39	12	2.0L	720	460L	3.4	26L	3.0L	5.0L	1.7L	w199682
w199683	42	21	10	1,100	460L	4.2	42L	3.0L	5.0L	2.8L	w199683
w199684	26	13	2.0L	680	460L	1.6	23	3.0L	5.0L	5.3	w199684
w199685	49	35	N	950	460L	5.2	24	3.0L	5.0L	11	w199685
w199686	34	15	2.0L	550	460L	3.3	33L	3.0L	5.0L	3.3	w199686
w199687	28	11	2.0L	460	460L	2.0	25	13	5.0L	4.5	w199687
w199689	45	22	11	4,700	460L	3.5	44	3.0L	5.0L	13	w199689
w199690	27	8.4	2.0L	1,900	460L	1.1	21	3.0L	5.0L	4.7	w199690
w199691	25	7.8	2.0L	910	460L	1.2	30	3.0L	5.0L	4.8	w199691
w199692	30	31	2.0L	3,200L	460L	3.5	30	3.0L	5.0L	5.0	w199692

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)
w199723	75	75	11	80	45
w199724	410	47	11	85	120
w199725	170	28	6.1	500	63
w199726	180	35	8.2	94	87
w199727	120	34	9.9	91	140
w199728	120	33	4.4	760	94
w199423	56	29	4.9	75	85
w199424	120	40	5.1	52	140
w199660	120	89	5.1	56	190
w199661	210	75	5.7	140	140
w199662	130	86	4.0	59	620
w199663	260	87	7.0	250	150
w199664	140	99	5.9	130	470
w199665	230	92	6.3	42	610
w199666	300	140	8.5	300	370
w199667	160	89	5.5	140	220
w199668	240	84	6.1	41	540
w199669	170	130	8.0	190	250
w199670	220	78	7.2	180	170
w199671	430	180	14	270	540
w199672	180	220	12	480	220
w199673	400	170	10	310	720
w199674	470	120	11	33	840
w199675	430	150	12	170	270
w199676	220	200	18	510	180
w199677	370	95	11	28	470
w199678	150	180	8.0	140	190
w199679	290	55	8.2	64	130
w199680	250	140	8.9	110	1,000
w199681	330	57	2.8	180	110
w199682	210	97	6.9	140	300
w199683	310	130	8.3	100	250
w199684	190	66	4.8	190	230
w199685	400	130	12	230	190
w199686	240	92	6.6	160	290
w199687	230	99	5.5	55	540
w199689	320	89	12	260	200
w199690	160	39	4.7	39	180
w199691	120	86	6.6	37	540
w199692	220	140	8.5	55	860

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w199693	9.5	41	26	0.89	0.50	0.28	1.9	25	1.0	0.01	w199693
w199694	16.6	36	28	1.5	.22	.08	.60	28	.76	.20	w199694
w199695	7.0	44	25	1.2	.46	.19	1.4	23	1.2	.01	w199695
w199696	9.1	23	15	3.4	.50	.30	.72	52	.60	.03	w199696
w199697	14.6	11	7.0	.72	.08	.09	.07	80	.12	.01	w199697
w199698	17.4	22	15	.71	.27	.08	.73	57	.62	.01	w199698
w199703	8.7	46	36	.96	.35	.15	1.0	9.2	1.0	.01	w199703
w199704	7.6	16	11	1.8	.27	.18	.27	67	.43	.00	w199704
w199705	22.8	33	24	.45	.23	.12	.68	37	.71	.08	w199705
w199706	6.9	25	15	1.4	.32	.20	.52	52	.67	.01	w199706
w199707	9.2	51	34	1.2	.68	.29	2.7	2.1	1.5	.01	w199707
w199708	37.5	54	27	.27	1.1	.18	3.3	7.2	1.4	.06	w199708
w199709	9.3	47	24	4.8	1.1	.14	1.2	8.3	1.4	.01	w199709
w199710	4.0	38	33	4.7	1.7	.67	.99	3.6	1.6	.02	w199710
w199711	10.7	54	26	.90	.78	.25	2.9	11	1.2	.03	w199711
w199712	17.8	42	22	.62	1.1	.23	2.6	25	.86	.09	w199712
w199713	5.5	43	33	2.4	.71	.25	1.4	11	1.0	.01	w199713
w199714	4.1	29	22	1.3	.30	.33	.60	41	.73	.01	w199714
w199715	3.8	20	14	1.7	.35	.35	.45	53	.59	.01	w199715
w199716	7.5	27	15	1.3	.45	.18	1.3	51	.70	.01	w199716
w199729	7.4	24	14	1.5	.43	.18	1.1	53	.60	.02	w199729
w199730	2.8	42	36	3.6	.58	2.4	.53	5.4	1.1	.01	w199730
w199731	5.7	42	25	5.2	.86	.24	1.9	13	.94	.02	w199731
w199732	11.8	47	35	.73	.43	.11	1.7	8.6	2.2	.01	w199732
w199733	24.1	48	36	.20	.91	.22	4.0	5.3	1.0	.01	w199733
w199734	30.4	59	26	.19	.93	.18	3.0	4.6	1.8	.03	w199734
w199735	5.2	50	35	1.1	.80	.26	2.3	2.3	1.4	.01	w199735
w199736	6.3	36	24	1.7	.56	.43	1.4	29	.93	.01	w199736
w199737	29.8	58	25	1.2	1.2	.23	2.8	3.7	1.2	.33	w199737
w199738	3.4	46	33	3.6	.63	1.2	.35	4.0	1.8	.00	w199738
w199739	11.1	40	32	1.2	.35	.24	.87	19	.81	.12	w199739
w199740	13.4	23	17	.96	.25	.10	.48	55	.49	.01	w199740
w201274	14.2	50	33	1.1	.66	.19	2.0	6.7	.74	.02	w201274
w201275	12.7	19	11	1.1	.18	.11	.28	61	.19	.00	w201275
w201276	8.3	33	24	1.7	.33	.16	67	30	1.0	.12	w201276
w201277	16.2	44	34	.42	.63	.17	3.1	12	1.5	.01	w201277
w201278	10.8	25	16	1.1	.22	.12	.47	49	.72	.04	w201278
w201279	23.9	49	39	.34	.63	.28	3.7	2.5	1.2	.01	w201279
w201280	11.6	52	41	.68	.18	.12	.57	1.1	1.4	.01	w201280
w201281	12.4	53	41	.63	.17	.11	.32	1.4	3.0	.01	w201281

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	SO3 (percent)	Ag-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w199693	0.81	0.30	48	290	19	0.39	130	61	140	8.4	w199693
w199694	1.0	.50	300	400	16	1.9	66	28	72	3.0	w199694
w199695	1.3	.70	53	400	18	.55	260	21	190	4.3	w199695
w199696	3.1	.40	45	360	21	.28	130	46	91	3.3	w199696
w199697	.78	1.0	280	68	11	.24	41	45	29	4.8L	w199697
w199698	.96	.90	280	690	11	1.1	100	71	170	4.0	w199698
w199703	.83	2.0	41	150	27	1.2	150	92	240	3.4	w199703
w199704	2.6	.40	70	86	23	.48	120	93	79	2.6L	w199704
w199705	.68	.40	11	170	8.0	2.2	310	130	210	3.5	w199705
w199706	2.0	.50	800	69	18	.98	140	230	88	2.9	w199706
w199707	.87	.20	71	290	20	.64	170	65	210	16	w199707
w199708	.63	.10	62	650	7.0	.10L	110	11	130	15	w199708
w199709	6.4	.30	35	360	11	.14	170	22	140	4.3	w199709
w199710	9.2	.10L	93	380	9.0	.21	300	80	210	5.0	w199710
w199711	1.4	.30	90	390	11	.31	140	35	140	12	w199711
w199712	1.3	.30	220	250	12	.64	180	36	110	6.2	w199712
w199713	3.8	.10	67	1,300	56	3.1	150	110	190	7.3	w199713
w199714	2.1	2.0	1,500	190	38	.69	120	90	150	15L	w199714
w199715	3.1	2.0	1,500	150	41	1.2	160	170	61	5.3	w199715
w199716	2.0	.70	57	160	17	1.0	53	91	120	5.3	w199716
w199729	2.0	1.7	14	280	24	.81	81	55	120	4.1	w199729
w199730	4.5	1.3	180	170	20	1.2	210	71	270	71L	w199730
w199731	6.5	.30	2,000	500	27	2.4	140	39	240	5.3	w199731
w199732	.43	.30	45	150	20	.82	280	75	230	4.2	w199732
w199733	.01L	.60	95	400	12	.95	150	38	200	20	w199733
w199734	.01L	.20	70	430	10	.34	140	28	160	17	w199734
w199735	1.1	1.1	93	470	35	.30	170	100	250	13	w199735
w199736	1.9	1.6	22	340	40	2.2	110	81	330	13	w199736
w199737	.01L	.40	60	830	8.0	.84	140	47	110	8.7	w199737
w199738	4.5	.70	240	220	87	.32	210	320	250	29L	w199738
w199739	1.3	2.6	900	340	13	1.4	380	120	290	4.5	w199739
w199740	1.0	.50	500	180	20	1.1	120	100	110	1.5	w199740
w201274	1.8	.40	680G	430	42	6.0	280	73	180	7.7	w201274
w201275	2.0	.90	680G	140	32	1.7	240	430	77	1.6	w201275
w201276	2.1	.50	N	530	25	1.5	170	88	130	2.4	w201276
w201277	.62	.70	130	550	19	1.3	140	61	200	10	w201277
w201278	1.7	.30	150	180	30	.64	160	29	110	1.9	w201278
w201279	.28	.80	80	590	14	1.7	220	72	200	22	w201279
w201280	.69	.20	36	440	34	.40	220	73	200	3.4	w201280
w201281	.68	1.4	65	310	16	.84	380	49	260	2.4L	w201281

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Ho-S (ppm)	La (ppm)	Sample number
w199693	60	22L	10L	3.1	43	16	13	6.3	7.0L	74	w199693
w199694	160	22L	10L	1.2	100	21	30	3.0	7.0L	30	w199694
w199695	130	22L	10L	3.1	70	17	80	8.6	15L	160	w199695
w199696	78	22	10L	2.7	40	28	4.0	4.4	7.0L	66	w199696
w199697	27	22L	10L	1.0	40	15L	2.0L	3.4L	7.0L	14	w199697
w199698	180	22L	10L	2.3	51	30	20	4.0	7.0L	40	w199698
w199703	190	22L	10L	4.6	92	15L	130	6.9	7.0L	57	w199703
w199704	130	22L	10L	3.3	72	19	40	2.6	7.0L	26	w199704
w199705	95	22L	10L	6.6	60	15L	8.0	4.8	7.0L	160	w199705
w199706	110	22L	10L	2.9	40	15L	2.0	4.3	7.0L	58	w199706
w199707	140	22L	10L	4.8	67	15L	31	7.6	7.0L	65	w199707
w199708	60	22L	10L	1.6	39	15L	5.0	6.7	7.0L	59	w199708
w199709	86	22L	10L	3.1	49	15L	62	7.5	7.0L	86	w199709
w199710	200	22L	10L	4.0	38	15L	5.0	7.5	7.0L	170	w199710
w199711	69	22L	10L	2.1	36	15L	2.0L	6.5	7.0L	75	w199711
w199712	92	22L	10L	3.0	49	15L	69	5.1	7.0L	100	w199712
w199713	160	24	18	5.1	76	15L	81	5.5	7.0L	55	w199713
w199714	270	22L	10	4.9	180	20	440	4.9	7.0L	49	w199714
w199715	190	22L	10L	5.0	150	19	250	2.6	7.0L	79	w199715
w199716	97	22L	10L	2.3	92	15L	230	4.0	7.0L	27	w199716
w199729	170	22L	10L	2.7	120	15L	110	2.7	7.0L	27	w199729
w199730	240	22L	10L	6.1	89	15	4.0	7.1	7.0L	110	w199730
w199731	76	22L	10L	8.4	120	26	9.0	5.3	7.0L	53	w199731
w199732	140	22L	10L	4.1	44	15L	3.0	12	7.0L	150	w199732
w199733	600	22L	10L	2.4	93	15L	12	6.6	7.0L	87	w199733
w199734	74	22L	10L	2.3	45	15L	2.0	8.9	7.0L	86	w199734
w199735	120	22L	10L	4.2	93	15L	89	7.7	7.0L	96	w199735
w199736	210	26	10L	5.4	140	19	73	9.5	7.0L	48	w199736
w199737	100	22L	10L	2.6	31	15L	4.0	5.7	7.0L	74	w199737
w199738	260	22L	11	5.9	140	15L	280	8.8	7.0L	120	w199738
w199739	290	22L	10L	4.8	70	15L	10	5.4	7.0L	190	w199739
w199740	150	22L	10L	3.4	40	21	3.0	3.0	7.0L	52	w199740
w201274	180	34	18	8.0	100	33	34	5.6	9.0	150	w201274
w201275	130	28	14	4.5	35	32	7.0	1.6	7.0L	150	w201275
w201276	130	22L	10L	3.7	49	15L	12	4.8	7.0L	84	w201276
w201277	230	22L	10L	2.1	99	15L	67	8.0	7.0L	68	w201277
w201278	78	22L	10L	2.3	52	25	53	3.7	7.0L	83	w201278
w201279	430	22L	13	4.2	90	18	19	6.3	7.0L	100	w201279
w201280	100	22L	19	5.2	82	23	7.0	7.8	15L	100	w201280
w201281	230	22L	16	4.9	85	15L	9.0	15	7.0L	230	w201281

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Sample number
w199693	120	1	48	24	16	90	200	32	150L	420L	w199693
w199694	260	.6	74	21	14	100	190	75	150L	180L	w199694
w199695	130	1	120	82	29	100	230	64	150L	570L	w199695
w199696	64	1	340	120	26	57	99	32	68L	440L	w199696
w199697	41	.7	60	23	14	46L	75	44	68L	270L	w199697
w199698	180	1	220	63	29	83	130	150	68L	230L	w199698
w199703	380	2	38	140	12	46L	420	130	68L	340L	w199703
w199704	63	1L	520	7.0L	9	49	250	180	68L	390L	w199704
w199705	270	2	88	9.0	6	55	140	63	68L	220L	w199705
w199706	110	1	100	29	12	46L	370	400	68L	430L	w199706
w199707	300	2	170	12	14	46L	160	91	68L	160	w199707
w199708	720	.8	64	2.0L	12	46L	41	57	68L	200	w199708
w199709	120	1	220	58	16	46L	37	300	68L	320L	w199709
w199710	130	3	400	8.0	13	51	110	120	68L	750L	w199710
w199711	100	.9	95	14	14	46L	66	67	68L	280L	w199711
w199712	160	1	94	6.0	7	46L	81	290	68L	220L	w199712
w199713	240	2	550	20	16	87	210	94	68L	550L	w199713
w199714	75	2	110	55	14	66	730	310	68L	730L	w199714
w199715	48	3	36	46	9	63	850	520	68L	530L	w199715
w199716	48	1	180	67	7	46L	120	180	68L	400L	w199716
w199729	57	1	79	85	9	47	300	210	68L	540L	w199729
w199730	200	4	52	66	10	46L	95	88	68L	1,800L	w199730
w199731	110	4	130	38	14	46L	58	54	68L	530L	w199731
w199732	290	2	110	14	17	51	76	100	68L	340L	w199732
w199733	560	1	110	13	8	46L	100	170	68L	270	w199733
w199734	290	1	130	4.0	23	68	55	71	68L	240	w199734
w199735	150	2	64	57	8	72	310	65	68L	770L	w199735
w199736	81	3	75	35	17	61	150	160	68L	630L	w199736
w199737	130	1	150	2.0L	10	46L	82	61	68L	150	w199737
w199738	160	3	52	19	17	46L	870	120	68L	1,200L	w199738
w199739	390	2	35	37	5	100	130	70	68L	450L	w199739
w199740	180	1	100	35	7	47	110	31	68L	300L	w199740
w201274	2,600	3	430	32	9	150	160	86	68L	130	w201274
w201275	74	2	140	22	8	130	250	10L	68L	240L	w201275
w201276	160	1	79	21	25	110	330	160	150L	360L	w201276
w201277	380	1	45	12	14	54	230	180	68L	240	w201277
w201278	140	.9	460	95	21	81	72	230	150L	280L	w201278
w201279	340	2	57	15	14	140	200	150	68L	230	w201279
w201280	270	3	72	6.0	32	110	270	110	68L	170L	w201280
w201281	290	2	48	24	94	170	160	190	68L	240L	w201281

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Ta (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	Tm (ppm)	U (ppm)	Sample number
w199693	31	14	2.0L	460	460L	2.1	32L	35	5.0L	2.1L	w199693
w199694	13	5.4	2.0L	3,500	460L	.60	18L	3.0L	5.0L	1.2L	w199694
w199695	33	16	2.0L	810	460L	2.9	43L	3.0L	5.0L	2.9	w199695
w199696	16	12	N	1,100	460L	5.5L	33L	3.0L	5.0L	2.2L	w199696
w199697	4.8	4.8	N	400	460L	3.4L	21L	3.0L	5.0L	1.4L	w199697
w199698	41	11	N	370	460L	4.0L	17L	3.0L	5.0L	8.0	w199698
w199703	43	22	5.0	400	460L	3.4	34L	3.0L	5.0L	22	w199703
w199704	16	B	N	420	460L	2.6	39L	3.0L	5.0L	2.6L	w199704
w199705	57	30	2.0L	430	460L	4.8	13L	3.0L	5.0L	11	w199705
w199706	19	13	4.0	170	460L	5.8L	43L	3.0L	5.0L	2.9L	w199706
w199707	37	22	5.0	350	460L	3.3	33L	3.0L	5.0L	3.3	w199707
w199708	27	8.0	2.0	440	460L	1.3	21	3.0L	5.0L	5.9	w199708
w199709	29	15	4.0	340	460L	1.1	32L	3.0L	5.0L	14	w199709
w199710	45	20	4.0	840	460L	2.5	75L	3.0L	5.0L	5.0L	w199710
w199711	28	11	2.0L	800	460L	1.9	28L	3.0L	5.0L	1.9L	w199711
w199712	39	15	2.0L	740	460L	3.4	22	3.0L	5.0L	2.2	w199712
w199713	73	20	3.0	830	460L	5.5	55L	3.0L	5.0L	3.6L	w199713
w199714	110	22	2.0L	520	460L	4.9	73L	46	5.0L	4.9L	w199714
w199715	42	21	2.0L	720	460L	5.3	79L	3.0L	5.0L	5.3L	w199715
w199716	35	11	2.0	230	460L	6.7L	40L	3.0L	5.0L	2.7L	w199716
w199729	39	11	6.0	260	460L	4.1L	41L	3.0L	5.0L	30	w199729
w199730	50	25	10	710	460L	3.6	110L	3.0L	5.0L	7.1L	w199730
w199731	54	33	11	680	460L	7.0	53L	3.0L	5.0L	12	w199731
w199732	42	20	8.0	210	460L	2.5	42	3.0L	5.0L	9.3	w199732
w199733	51	12	2.0L	210	460L	1.7	41	5.0	5.0L	17	w199733
w199734	38	12	6.0	410	460L	1.3	36	3.0L	5.0L	6.9	w199734
w199735	58	19	6.0	700	460L	3.8	58L	3.0L	5.0L	5.8	w199735
w199736	98	24	2.0L	820	460L	4.8	48L	3.0L	5.0L	14	w199736
w199737	23	12	4.0	1,500	460L	2.0	20	3.0L	5.0L	4.0	w199737
w199738	120	26	8.0	1,300	460L	5.9	88L	3.0L	5.0L	5.9L	w199738
w199739	58	24	2.0L	3,200	460L	3.6	27L	3.0L	5.0L	8.1	w199739
w199740	25	16	2.0L	340	460L	2.2	22L	3.0L	5.0L	4.5	w199740
w201274	70	31	2.0L	990	460L	7.0	35	5.0	5.0L	12	w201274
w201275	16	17	N	330	460L	3.9	24L	3.0L	5.0L	3.1	w201275
w201276	28	16	2.0L	4,300	460L	2.4	36L	3.0L	5.0L	6.0	w201276
w201277	49	10	2.0L	350	460L	1.2	31	16	5.0L	12	w201277
w201278	25	10	N	1,400	460L	1.9	28L	3.0L	5.0L	14	w201278
w201279	53	21	7.0	350	460L	3.3	46	3.0L	5.0L	26	w201279
w201280	38	22	5.0	540	460L	5.2	26L	3.0L	5.0L	9.5	w201280
w201281	56	25	11	850	460L	3.2	32	3.0L	5.0L	17	w201281

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)
w199693	150	86	7.4	82	220
w199694	310	64	3.0	190	150
w199695	220	100	7.1	160	400
w199696	130	99	4.4	120	270
w199697	57	41	1.4	46	50
w199698	180	77	5.2	510	290
w199703	210	44	13	310	99
w199704	53	64	20L	140	87
w199705	130	40	11	380	65
w199706	110	32	5.8	490	57
w199707	160	52	13	110	140
w199708	120	25	5.1	47	74
w199709	140	38	6.5	96	160
w199710	120	28	10	530	110
w199711	120	30	5.6	140	100
w199712	97	23	6.7	190	77
w199713	150	130	16	290	160
w199714	130	100	15	310	110
w199715	48	85	13	640	54
w199716	90	27	8.0	390	51
w199729	220	49	6.8	400	65
w199730	240	73	14	290	91
w199731	230	120	16	150	120
w199732	130	29	8.5	99	110
w199733	340	38	6.2	97	99
w199734	190	50	6.9	180	160
w199735	260	90	12	140	160
w199736	290	120	19	510	130
w199737	88	32	4.7	370	98
w199738	270	120	21	160	150
w199739	240	63	9.9	290	110
w199740	110	63	7.5	65	73
w201274	290	200	17	670	210
w201275	75	160	10	210	78
w201276	150	100	6.0	150	460
w201277	380	72	8.0	140	200
w201278	160	92	6.5	64	230
w201279	510	120	12	180	240
w201280	310	230	21	100	370
w201281	370	140	10	86	900

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w201282	8.8	57	33	1.2	0.27	0.15	0.23	2.0	2.9	0.01	w201282
w201283	18.6	46	42	.57	.20	.07	.63	6.3	3.3	.02	w201283
w201284	17.0	47	20	.75	.12	.08	.06	26	3.0	.02	w201284
w201285	8.9	29	23	2.3	.38	.15	.41	35	.95	.05	w201285
w201286	7.5	49	41	1.4	.35	.18	.65	2.8	1.7	.03	w201286
w201287	5.2	45	39	1.7	.46	.26	.70	7.8	1.1	.01	w201287
w200449	17.3	43	22	.73	.30	.16	.99	26	2.1	.02	w200449
w200450	13.5	39	24	.97	.36	.10	.92	28	1.3	.02	w200450
w200451	19.0	45	31	.59	.41	.14	1.7	11	1.8	.02	w200451
w196592	29.1	72	14	1.4	.78	.51	1.8	4.5	.85	.22	w196592
w196593	28.6	78	12	1.3	.71	.47	1.8	3.3	.90	.07	w196593
w196594	9.7	55	28	2.0	.40	.28	1.5	2.8	1.5	1.7	w196594

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	SO3 (percent)	Ag-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w201282	1.7	2.5	67	470	45	1.3	360	93	250	3.4L	w201282
w201283	.72	.40	86	230	18	1.1	270	28	300	1.6	w201283
w201284	1.2	.60	N	78	19	2.0	210	75	200	1.8L	w201284
w201285	3.2	.50	N	320	19	1.1	210	39	140	3.4	w201285
w201286	1.9	.40	55	610	17	.76	280	72	210	2.7L	w201286
w201287	2.5	1.0	38	590	31	2.4	330	170	190	1.9	w201287
w200449	1.3	.30	51	230	5.0	.69	160	25	190	4.6	w200449
w200450	1.6	.60	45	200	6.0	.77	160	37	160	3.7	w200450
w200451	.83	.40	44	300	27	.44	160	32	210	7.4	w200451
w196592	1.5	.10L	220	390	11	2.2	1.5	25	99	4.1	w196592
w196593	1.0	.20	200	340	15	1.4	170	20	84	4.5	w196593
w196594	1.0	.30	290	1,100	26	.28	360	74	210	5.2	w196594

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Ho-S (ppm)	La (ppm)	Sample number
w201282	280	22L	16	5.1	110	15L	40	20	15L	200	w201282
w201283	190	22L	16	3.8	98	15L	3.0	15	7.0L	160	w201283
w201284	190	22L	13	3.7	55	15L	4.0	14	7.0L	120	w201284
w201285	170	25	10L	4.0	43	22	2.0	5.6	7.0L	110	w201285
w201286	180	22L	12	3.9	130	15	31	8.0	7.0L	170	w201286
w201287	120	36	10	7.3	140	35	72	5.8	9.0	150	w201287
w200449	130	22L	10L	2.4	52	7.0L	2.0	10	7.0L	98	w200449
w200450	140	22L	10L	2.5	48	7.0L	2.0L	5.9	7.0L	89	w200450
w200451	300	22L	10L	3.4	53	12	5.0	8.9	7.0L	89	w200451
w196592	42	22L	10L	3.0	28	18	4.0	9.3	7.0L	89	w196592
w196593	50	30	16	5.3	42	22	47	10	7.0	73	w196593
w196594	200	22L	14	6.9	28	25	2.0L	9.3	7.0L	210	w196594

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Sample number
w201282	210	2	63	55	120	160	220	160	68L	340L	w201282
w201283	320	2	30	21	96	130	210	140	68L	160L	w201283
w201284	190	2	55	37	90	100	230	70	68L	180L	w201284
w201285	220	1	97	34	30	120	170	38	68L	340L	w201285
w201286	270	1	69	46	50	170	220	140	150L	270L	w201286
w201287	230	2	54	99	27	180	440	110	68L	380L	w201287
w200449	290	1	86	13	22	46L	42	300	82	350L	w200449
w200450	400	.7	97	11	20	64	48	180	68L	410L	w200450
w200451	400	2	51	9.0	19	46L	70	120	68L	340L	w200451
w196592	99	.7	380	12	19	91	88	32	68L	160L	w196592
w196593	78	1	360	10	23	140	150	40	68L	2L	w196593
w196594	160	1	180	25	24	230	100	53	68L	300L	w196594

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Ta (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	Tm (ppm)	U (ppm)	Sample number
w201282	64	26	11	1,400	460L	4.5	34L	3.0L	5.0L	17	w201282
w201283	49	19	8.0	550	460L	2.2	65	3.0L	5.0L	15	w201283
w201284	30	17	N	400	460L	2.4	47	3.0L	5.0L	13	w201284
w201285	28	18	2.0L	2,300	460L	2.2	34L	3.0L	5.0L	10	w201285
w201286	39	20	12	2,500	460L	2.7	40L	3.0L	5.0L	12	w201286
w201287	50	33	2.0L	1,900	460L	5.8	58L	3.0L	5.0L	15	w201287
w200449	33	12	2.0	490	460L	1.7	58	3.0L	5.0L	13	w200449
w200450	30	13	2.0L	580	460L	1.5	52	3.0L	5.0L	8.9	w200450
w200451	51	15	2.0L	560	460L	3.2	42	3.0L	5.0L	21	w200451
w196592	17	13	2.0L	700	460L	2.4	14	3.0L	5.0L	4.8	w196592
w196593	22	22	5.0	310	460L	4.2	10L	3.0L	5.0L	5.9	w196593
w196594	32	30	8.0	4,800	460L	5.2	31L	3.0L	5.0L	13	w196594

Table 5f.--Major and minor oxide and trace element compostion of the laboratory ash of 132 bituminous coal samples from Pennsylvania--continued

Sample number	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)
w201282	370	170	16	150	1,000
w201283	350	100	9.1	56	710
w201284	200	130	11	110	850
w201285	160	110	7.9	110	430
w201286	300	140	6.7	96	630
w201287	340	240	13	220	430
w200449	110	30	6.4	59	140
w200450	97	37	5.2	69	200
w200451	210	50	8.9	75	92
w196592	120	89	4.5	510	340
w196593	110	130	9.8	380	450
w196594	240	140	9.3	110	280

Table 5g.--Content of 22 trace elements in 132 bituminous coal samples from Pennsylvania.

[Analysis performed on whole-coal. Values in parts-per-million (ppm). L, less than the value shown; B, not determined.]

Sample number	As (ppm)	Ce (ppm)	Cl (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	Sample number
w199581	80	32	380	5.6	33	3.2	0.50	44	1.9	0.70	w199581
w199582	40	20	670	18	18	1.5	.36	26	.8	.42	w199582
w199583	120	12	1,000	5.9	6.1	.3	.45	20L	.8L	.44	w199583
w199584	19	20	500	2.0	21	.5	.37	56	.7	.54	w199584
w199585	9.0	23	600	7.2	25	1.9	.38	42	1.0	.13	w199585
w199586	3.0L	40	500	12	19	.6	1.3	44	.6	.45	w199586
w199587	5.0	17	600	8.4	17	1.2	.32	26	.7	.080	w199587
w199588	1.0	6.0	700	4.6	4.9	.2	.35	28	.3	.64	w199588
w199589	20	16	680	7.3	17	.9	.33	38	.6	.29	w199589
w199590	51	20	720	6.1	15	.4	.31	42	.8	.68	w199590
w199591	17	18	1,100	11	12	.8	.36	54	.5	.26	w199591
w199592	12	20	900	10	28	1.9	.49	110	1.0	.24	w199592
w199593	2.0	10	1,800	7.2	20	.8	.53	26	.6	.050	w199593
w199594	170	16	580	17	17	.8	.38	20L	.7	1.7	w199594
w199595	2.0	5.0	260	4.6	8.9	.3	.14	20L	.3	.27	w199595
w199596	1.0	22	370	6.4	22	.6	.33	26	1.0	.070	w199596
w199597	65	13	1,900	8.8	13	.3	.31	20L	.5	.18	w199597
w199598	2.0	10	1,500	2.8	14	.8	.34	28	.5	.010	w199598
w199599	20	24	760	5.2	16	1.3	.47	24	.7	.14	w199599
w199600	67	18	1,200	2.2	14	.5	.39	20L	.6	.24	w199600
w199601	61	5.0	1,000	8.2	3.7	.3	.24	28	.2	.52	w199601
w199602	14	46	400	34	47	3.3	.75	56	2.1	.40	w199602
w199603	1.0	27	400	14	20	1.6	.45	44	.9	.060	w199603
w199604	25	15	1,800	4.4	7.6	.4	.54	20L	.2	.090	w199604
w199605	30	31	1,300	4.8	21	.9	.61	130	1.0	.32	w199605
w199606	7.0	41	460	6.4	21	1.8	.48	72	.9	.10	w199606
w199607	1.0	16	1,600	13	15	.3	.44	20L	.3	.020	w199607
w199608	1.0	18	1,200	29	17	1.1	.58	42	.5	.010L	w199608
w199609	4.0	20	850	4.0	17	.9	.31	56	1.0	.26	w199609
w199610	45	24	810	6.2	26	1.9	.45	42	1.1	.35	w199610
w199611	17	27	1,000	5.7	24	1.8	.47	38	.9	.26	w199611
w199612	110	29	1,200	14	29	2.0	.52	54	1.0	.57	w199612
w199613	69	14	830	5.4	15	1.1	.24	36	.6	.51	w199613
w199614	47	19	1,600	7.1	21	1.5	2.0L	20L	.9	.35	w199614
w199717	2.0	32	1,100	4.6	17	.9	.50	28	1.0	.060	w199717
w199718	19	14	430	4.1	15	1.5	.40	56	.6	.56	w199718
w199719	81	9.0	1,400	8.7	12	.6	.53	21	.3	.50	w199719
w199720	4.0	27	520	6.2	20	1.0	.42	20L	1.2	.13	w199720
w199721	22	16	1,300	7.3	13	.9	.36	40	.5	.50	w199721
w199722	17	8.0	1,200	5.7	5.9	1.5L	.19	20L	.7L	.13	w199722

Table 5g.--Content of 22 trace elements in 132 bituminous coal samples from Pennsylvania--continued

Sample number	La (ppm)	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Sample number
w199581	18	0.3	400	54	47	1.7	9.7	2.5	2.6	0.3	w199581
w199582	10	.2	200	10	21	.50	3.6	3.5	1.9	.3	w199582
w199583	5	.4	98	5	40L	2.8	8.8	6.4	2.0	.6	w199583
w199584	12	.1	97	29	30L	.70	4.7	1.5	1.9	.3	w199584
w199585	12	.2	200	11	31	1.2	5.4	2.3	2.1	.3	w199585
w199586	19	.8	300	3	40L	.90	8.8	3.1	6.3	1	w199586
w199587	10	.1	97	6	23	.50	3.3	1.5	1.7	.3	w199587
w199588	3	.2	100	1	30L	1.7	4.5	7.1	1.2	.4	w199588
w199589	9	.1	200	6	70L	.70	3.1	2.3	1.6	.3	w199589
w199590	11	.2	200	14	70L	.90	4.0	8.1	1.6	.8L	w199590
w199591	9	.2	200	14	60L	.80	4.3	3.7	1.7	.3	w199591
w199592	10	.3	200	10	70L	2.5	6.6	2.1	2.0	.3	w199592
w199593	5	.2	100	6	50L	4.0	4.0	1.6	2.1	.4	w199593
w199594	8	.2	300	11	70L	2.7	5.3	2.8	1.6	.3	w199594
w199595	3	.1	100	1	40L	.30	2.1	3.9	.60	.2	w199595
w199596	13	.1	100	6	50L	.40	3.8	3.4	1.8	.2	w199596
w199597	8	.1	97	6	60L	1.6	2.8	1.8	1.3	.7L	w199597
w199598	5	.2	100	3	50L	.30	2.9	1.0	1.5	.3	w199598
w199599	14	.3	300	19	70L	2.3	7.8	3.4	2.1	.5	w199599
w199600	9	.2	97	6	50L	1.4	3.2	7.4	1.8	.3	w199600
w199601	3	.1	100	3	50L	1.6	1.9	6.3	.90	.6L	w199601
w199602	25	.3	400	18	64	3.7	10	13	4.0	.4	w199602
w199603	15	.2	100	7	40L	1.6	5.2	3.7	2.5	.3	w199603
w199604	8	.2	99	4	30L	4.4	5.7	2.3	2.2	.4	w199604
w199605	17	.2	200	180	40L	.60	4.3	4.2	3.1	.4	w199605
w199606	22	.2	200	82	25	1.7	4.5	1.3	2.8	.2	w199606
w199607	10	.2	99	4	30L	.70	2.9	5.0L	2.1	.4	w199607
w199608	9	.3	200	12	26	2.4	7.8	2.1	2.4	.5	w199608
w199609	11	.2	800	37	40L	.30	4.2	5.5	1.6	.2	w199609
w199610	13	.2	200	21	34	2.0	5.3	3.4	2.3	.4	w199610
w199611	13	.1	200	7	29	.90	4.2	1.0	2.6	.3	w199611
w199612	16	.2	300	49	44	2.9	5.5	2.9	2.6	.3	w199612
w199613	7	.1	200	6	40L	2.3	2.9	2.1	1.2	.2	w199613
w199614	10	.2	200	8	40L	1.7	3.9	5.7	1.8	.8L	w199614
w199717	19	.2	200	29	30L	.80	4.0	4.1	2.6	.4	w199717
w199718	8	.3	200	13	23	5.5	7.9	6.5	1.7	.4	w199718
w199719	4	.2	97	3	30L	.90	3.1	2.9	1.9	.4	w199719
w199720	16	.2	200	14	45L	1.1	4.5	2.1	2.0	.3	w199720
w199721	8	.1	200	6	45L	.60	2.5	1.5	1.6	.3	w199721
w199722	3	.1	100	2	40L	.50	1.3	6.8	.90	.2	w199722

Table 5g.--Content of 22 trace elements in 132 bituminous coal samples from Pennsylvania--continued

Sample number	Th (ppm)	U (ppm)	Yb (ppm)
w199581	4.0	3.7	1.8
w199582	3.0L	1.5	1.0
w199583	3.0L	4.6	2.2
w199584	3.0L	1.7	.8
w199585	3.0L	5.6	1.0
w199586	3.0L	1.7	4.2
w199587	3.0L	1.3	.8
w199588	3.0L	.90	1.2
w199589	3.0L	1.7	.8
w199590	3.0L	1.2	1.0
w199591	3.0L	1.7	1.1
w199592	3.0L	2.1	1.6
w199593	3.0L	1.3	1.2
w199594	3.0L	1.3	1.7
w199595	3.0L	1.2	.8
w199596	3.0L	1.6	.7
w199597	3.0L	1.5	.6
w199598	3.0L	1.5	.8
w199599	3.0L	3.9	2.0
w199600	3.0L	1.2	1.1
w199601	3.0L	.80	.7
w199602	6.0	4.8	1.6
w199603	3.0L	2.5	1.1
w199604	3.0L	1.4	1.2
w199605	3.0L	1.6	1.2
w199606	3.0L	1.3	1.3
w199607	3.0L	1.1	1.0
w199608	3.0L	1.7	2.0
w199609	3.0L	1.1	.9
w199610	3.0L	3.0	1.4
w199611	3.0L	1.7	.9
w199612	3.0L	2.1	1.2
w199613	3.0L	1.2	.7
w199614	3.0L	2.7	.9
w199717	3.0	.60	1.0
w199718	3.0L	2.1	1.5
w199719	3.0L	.30	1.4
w199720	5.0	.40	1.1
w199721	3.0L	.30	.8
w199722	3.0L	1.1	.5

Table 5g.--Content of 22 trace elements in 132 bituminous coal samples from Pennsylvania--continued

Sample number	As (ppm)	Ce (ppm)	Cl (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	Sample number
w199723	23	6.0	1,600	12	5.3	1.0L	0.21	20L	0.7L	0.56	w199723
w199724	16	24	1,000	3.2	33	.4	.40	26	.6	1.5	w199724
w199725	24	32	970	84	47	.4	.42	20	.8	.77	w199725
w199726	18	35	790	6.1	36	1.1	.59	52	1.0	.38	w199726
w199727	47	21	1,200	1.5	19	.4	.35	49	1.0	.37	w199727
w199728	35	5.0	1,100	5.2	6.7	1.0L	.12	23	.2	.090	w199728
w199423	4.0	9.0	B	2.8	9.3	.4	.18	120	.4	.23	w199423
w199424	3.0	8.0	B	1.3	7.9	.5	.14	140	.5	.070	w199424
w199660	14	10	640	5.0	11	.3	.27	40	.4	.29	w199660
w199661	3.0	16	1,500	5.3	11	.2	.27	20L	.7L	.11	w199661
w199662	45	9.0	980	1.4	12	.9	.23	20L	.8	.38	w199662
w199663	29	13	860	5.5	22	.8	.47	20L	.7	.26	w199663
w199664	23	34	490	4.2	23	1.3	.70	64	.9	.55	w199664
w199665	21	19	550	2.7	20	1.0	.35	20L	1.0	.26	w199665
w199666	1.0	15	740	12	13	1.0	.30	40	.5	.010L	w199666
w199667	22	10	810	2.8	9.0	.3	.18	29	.3	.13	w199667
w199668	21	40	530	2.4	29	.6	.59	36	1.3	.15	w199668
w199669	42	14	440	9.2	20	.8	.60	20L	.6	.26	w199669
w199670	73	21	580	6.5	23	.8	.36	32	.8	.30	w199670
w199671	10	37	410	16	39	1.5	.72	44	1.1	.13	w199671
w199672	69	9.0	1,400	2.5	6.0	.3	.38	20L	.3	.12	w199672
w199673	21	41	430	26	41	1.7	.88	20L	1.2	.35	w199673
w199674	1.0	47	140	7.1	30	.3	.70	29	2.2	.050	w199674
w199675	5.0	29	490	8.1	30	1.7	.69	40	1.1	.35	w199675
w199676	3.0	51	1,100	21	18	.7	1.4	20L	.6	.11	w199676
w199677	2.0	45	160	4.4	31	.2	.68	64	2.3	.12	w199677
w199678	11	6.0	1,700	1.2	6.0	.1	.25	20L	.2	.10	w199678
w199679	69	28	220	3.1	38	1.6	.58	20L	1.5	.59	w199679
w199680	9.0	24	1,300	16	18	.2	.45	24	1.1	.36	w199680
w199681	6.0	40	1,100	32	27	.7	.44	64	.8	.26	w199681
w199682	67	15	590	14	14	.6	.30	32	.5	.94	w199682
w199683	2.0	16	730	3.4	11	.7	.29	30	.5	.56	w199683
w199684	67	76	130	22	48	3.0	1.2	88	2.2	.36	w199684
w199685	46	97	330	14	45	.9	1.5	20L	1.1	.67	w199685
w199686	61	15	740	7.9	15	.9	.36	26	.6	.15	w199686
w199687	22	27	680	9.4	27	2.5	.46	25	1.5	.83	w199687
w199689	2.0	33	600	13	22	.9	.50	110	1.0	.030	w199689
w199690	54	47	200	3.7	46	5.8	.64	92	2.9	.30	w199690
w199691	7.0	16	1,000	2.6	16	.9	.27	42	1.2	.17	w199691
w199692	2.0	75	700	1.8	27	2.4	1.1	72	1.7	.010	w199692

Table 5g.--Content of 22 trace elements in 132 bituminous coal samples from Pennsylvania--continued

Sample number	La (ppm)	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Sample number
w199723	2	0.2	99	2	40L	0.60	1.5	4.8	0.90	0.2	w199723
w199724	17	.2	98	16	40L	.90	6.3	7.6	1.8	.4	w199724
w199725	19	.3	200	98	55L	.70	7.9	14	2.1	.6	w199725
w199726	19	.2	200	46	45L	.70	7.7	5.7	2.7	.4	w199726
w199727	12	.2	200	77	50L	1.3	4.7	4.1	1.7	.3	w199727
w199728	3	.1L	100	2	40L	1.4	1.3	1.8	.50	.3L	w199728
w199423	5	.1	500	180	43L	1.8L	1.9	1.6	.90	.1	w199423
w199424	5	.1	900	17	50L	2.0L	1.6	1.4	.70	.6L	w199424
w199660	5	.2	100	28	60L	.60	4.7	6.2	1.1	.4	w199660
w199661	8	.1	97	12	50L	.20	2.8	1.6	1.0	.2	w199661
w199662	5	.1	200	7	50L	.60	2.5	3.0	1.0	.6L	w199662
w199663	5	.2	200	11	60L	.80	5.0	2.2	1.8	.4	w199663
w199664	17	.2	200	180	70L	.80	5.7	3.3	2.9	.4	w199664
w199665	11	.1	300	110	60L	.40	4.2	4.0	1.6	.3	w199665
w199666	8	.1	97	14	60L	.60	2.9	1.4	1.3	.2	w199666
w199667	4	.1	200	13	50L	.90	2.7	3.2	.80	.6L	w199667
w199668	22	.2	94	240	70L	.90	6.7	3.6	2.7	.3	w199668
w199669	5	.2	200	9	33	.80	3.5	2.4	2.4	.4	w199669
w199670	12	.2	200	56	70L	.90	4.9	1.9	1.7	.3	w199670
w199671	18	.3	200	17	37	2.4	11	2.1	3.4	.6	w199671
w199672	5	.1	99	8	50L	.70	1.5	1.5	1.1	.4	w199672
w199673	20	.3	300	35	45	2.2	11	3.4	3.4	.8	w199673
w199674	26	.2	100	54	60L	.90	6.9	9.0	3.1	.5	w199674
w199675	17	.3	200	20	70L	1.6	9.4	2.5	2.6	.7	w199675
w199676	22	.3	100	28	60L	.30L	3.1	4.4	5.8	.9	w199676
w199677	25	.3	100	100	50L	.60	5.9	8.4	3.0	.5	w199677
w199678	2	.1	100	3	40L	.40	1.2	3.7	.90	.2	w199678
w199679	14	.3	200	21	60L	1.7	7.5	14	2.4	.5	w199679
w199680	12	.1	100	7	50L	.50	3.8	7.1	2.1	.4	w199680
w199681	26	.2	210	480	70L	.40	6.6	11	2.1	.8L	w199681
w199682	7	.1	200	18	50L	1.2	4.5	4.5	1.4	.4	w199682
w199683	8	.1	300	7	50L	.30	3.0	7.0L	1.5	.3	w199683
w199684	39	.4	490	190	88	2.3	12	4.0	5.7	.7	w199684
w199685	52	.4	200	72	80L	7.2	10	6.0	7.4	1	w199685
w199686	6	.1	200	4	50L	.70	3.1	2.9	1.4	.3	w199686
w199687	15	.2	190	7	33	.60	5.7	8.0	2.3	.4	w199687
w199689	18	.2	200	61	40L	2.9	5.1	2.8	2.5	.4	w199689
w199690	26	.3	590	280	89	.80	10	7.7	3.2	.4	w199690
w199691	10	.2	200	30	40L	.20	4.1	5.0	1.3	.2	w199691
w199692	36	.3	290	190	38	.20	6.0	2.4	6.1	.7	w199692

Table 5g.--Content of 22 trace elements in 132 bituminous coal samples from Pennsylvania--continued

Sample number	Th (ppm)	U (ppm)	Yb (ppm)
w199723	3.0L	0.20L	1.0
w199724	4.0	1.1	1.0
w199725	6.0	1.3	1.4
w199726	4.0	1.2	1.2
w199727	6.0	.70	1.2
w199728	3.0L	.90	.2
w199423	3.0L	.20L	.4
w199424	3.0L	.20L	.4
w199660	3.0L	1.2	.9
w199661	3.0L	.20L	.5
w199662	3.0L	.20	.5
w199663	3.0L	.90	1.0
w199664	6.0	2.4	1.2
w199665	4.0	.80	.8
w199666	3.0L	.20	.7
w199667	3.0L	.30	.5
w199668	4.0	1.8	1.3
w199669	3.0L	.30	1.1
w199670	3.0L	.30	.9
w199671	3.0L	1.0	1.8
w199672	3.0L	.20L	.7
w199673	5.0	1.4	2.0
w199674	8.0	1.7	1.3
w199675	3.0L	1.2	1.6
w199676	3.0L	.70	2.0
w199677	7.0	1.4	1.3
w199678	3.0L	.20L	.4
w199679	9.0	1.7	1.5
w199680	3.0L	.60	.8
w199681	5.0	.90	.9
w199682	3.0L	.20L	.8
w199683	3.0L	.20L	.6
w199684	10	2.3	2.1
w199685	5.0	2.3	2.6
w199686	3.0L	.30	.6
w199687	5.0	.90	1.1
w199689	5.0	1.5	1.3
w199690	8.0	1.8	1.8
w199691	5.0	.80	1.1
w199692	6.0	1.0	1.7

Table 5g.--Content of 22 trace elements in 132 bituminous coal samples from Pennsylvania--continued

Sample number	As (ppm)	Ce (ppm)	Cl (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	Sample number
w199693	53	12	570	5.8	13	0.8	0.29	26	0.6	0.85	w199693
w199694	40	11	1,500	4.7	12	.5	.20	20L	.5	.23	w199694
w199695	20	18	1,400	1.5	14	.3	.22	20L	.6	.44	w199695
w199696	96	12	1,200	4.2	8.3	.3	.25	20L	.4	.26	w199696
w199697	10	6.0	1,100	6.5	4.3	.7L	.15	20L	.5L	.53	w199697
w199698	10	18	1,100	12	30	.7	.40	20L	.7	.26	w199698
w199703	9.0	13	1,500	8.0	21	.3	.40	32	.6	.18	w199703
w199704	1.0L	9.0	1,700	7.1	6.0	.2L	.25	20L	.2	.19	w199704
w199705	31	71	800	30	48	.8	1.5	20	1.1	.95	w199705
w199706	11	10	2,000	16	6.1	.2	.20	20L	.3	.41	w199706
w199707	1.0	16	1,400	6.0	19	1.5	.44	20L	.7	.050	w199707
w199708	18	40	230	4.1	48	5.5	.61	96	2.5	.25	w199708
w199709	70	16	750	2.0	13	.4	.29	29	.7	1.8	w199709
w199710	1.0	12	410	3.2	8.4	.2	.16	21	.3	.60	w199710
w199711	20	15	1,600	3.7	15	1.3	.23	40	.7	.21	w199711
w199712	76	32	970	6.4	20	1.1	.54	48	.9	.48	w199712
w199713	2.0	8.0	1,900	6.3	11	.4	.28	23	.3	.040	w199713
w199714	39	5.0	2,400	3.7	6.2	.6L	.20	20L	.2	.18	w199714
w199715	16	6.0	2,100	6.3	2.3	.2	.19	23	.1	.28	w199715
w199716	81	4.0	1,600	6.8	9.1	.4	.17	20L	.3	.45	w199716
w199729	48	6.0	1,000	4.1	8.6	.3	.20	29	.2	.13	w199729
w199730	1.0L	6.0	1,200	2.0	7.7	2.0L	.17	32	.2	.010L	w199730
w199731	4.0	8.0	960	2.2	14	.3	.48	29	.3	.060	w199731
w199732	17	33	1,100	8.8	27	.5	.48	40	1.4	.13	w199732
w199733	14	36	480	9.1	48	4.8	.59	45	1.6	.11	w199733
w199734	7.0	44	270	8.6	48	5.2	.70	38	2.7	.050	w199734
w199735	1.0L	9.0	710	5.4	13	.7	.22	25	.4	.29	w199735
w199736	13	7.0	1,200	5.1	21	.8	.34	20L	.6	.15	w199736
w199737	7.0	42	330	14	34	2.6	.76	340	1.7	.020	w199737
w199738	1.0	7.0	1,100	11	8.4	1.0L	.20	33	.3	.010L	w199738
w199739	9.0	42	1,200	13	32	.5	.53	120	.6	.050	w199739
w199740	10	16	1,100	14	14	.2	.46	48	.4	.080	w199740
w201274	5.0	40	850	10	26	1.1	1.1	120	.8	.10	w201274
w201275	26	31	1,100	54	9.8	.2	.57	22	.2	.38	w201275
w201276	13	14	1,500	7.3	11	.2	.31	32	.4	.92	w201276
w201277	16	22	1,000	9.9	32	1.7	.34	56	1.3	.26	w201277
w201278	71	17	1,400	3.1	12	.2	.25	64	.4	.86	w201278
w201279	3.0	52	150	17	48	5.2	1.0	150	1.5	.28	w201279
w201280	1.0	25	240	8.5	23	.4	.60	32	.9	.050	w201280
w201281	2.0	47	540	6.1	33	.3L	.61	64	1.8	.040	w201281

Table 5g.--Content of 22 trace elements in 132 bituminous coal samples from Pennsylvania--continued

Sample number	La (ppm)	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Sample number
w199693	7	0.1	200	6	40L	0.60	2.9	1.2	1.3	0.2	w199693
w199694	5	.1	98	140	30L	1.0	2.2	4.6	.90	.1	w199694
w199695	11	.1	99	2	40L	.30	2.3	6.3	1.1	.2	w199695
w199696	6	.1	200	12	40L	.90	1.5	2.6	1.1	.5L	w199696
w199697	2	.1	97	8	40L	.20	.70	3.6	.70	.5L	w199697
w199698	7	.2	100	9	40L	.30	7.2	6.7	1.9	.7L	w199698
w199703	5	.2	97	4	30L	3.6	3.7	3.2	1.9	.3	w199703
w199704	2	.1L	100	1	30L	.20	1.2	1.9	B	.2	w199704
w199705	37	.4	200	78	50L	1.6	13	6.2	6.9	1	w199705
w199706	4	.1	100	2	30L	.20	1.3	1.9	.90	.4L	w199706
w199707	6	.2	200	4	15	1.3	3.4	1.6	2.0	.3	w199707
w199708	22	.3	500	92	74	1.3	10	5.7	3.0	.5	w199708
w199709	8	.1	96	4	30L	5.0	2.7	5.3	1.4	.1	w199709
w199710	7	.1	200	3	30L	.10	1.8	2.7	.80	.1	w199710
w199711	8	.1	200	15	30L	.40	3.0	1.1	1.2	.2	w199711
w199712	18	.2	300	69	40L	2.3	7.0	3.2	2.7	.6	w199712
w199713	3	.1	100	2	30L	1.0	4.0	1.3	1.1	.3	w199713
w199714	2	.1	100	1	30L	4.1	4.7	1.3	.90	.2	w199714
w199715	3	.1	99	2	20L	2.0	1.6	.8	.80	.2	w199715
w199716	2	.1	100	2	30L	6.2	2.6	2.0	.80	.5L	w199716
w199729	2	.1	99	5	40L	3.4	2.9	3.3	.80	.3L	w199729
w199730	3	.1	500	1	50L	.30	1.4	1.2	.70	.1	w199730
w199731	3	.2	100	4	30L	.20	3.1	2.3	1.9	.4	w199731
w199732	18	.2	96	7	40L	1.0	5.0	4.2	2.4	.3	w199732
w199733	21	.3	390	13	64	4.5	12	14	3.0	.4	w199733
w199734	26	.4	410	40	72	1.0	11	2.8	3.5	.4	w199734
w199735	5	.1	100	2	40L	.30	3.0	4.6	1.0	.2	w199735
w199736	3	.2	200	2	40L	2.5	6.2	3.2	1.5	.3	w199736
w199737	22	.3	510	430	46	.40	6.9	13	3.7	.6	w199737
w199738	4	.1	300		40L	2.7	4.0	1.7	.90	.2	w199738
w199739	21	.2	200	59	50L	1.0	6.4	10	2.7	.4	w199739
w199740	7	.2	99	5	40L	.20	3.3	10	2.1	.3	w199740
w201274	21	.4	200	11	18	.50	9.9	8.8	4.4	1	w201274
w201275	19	.2	100	1	30L	.30	2.0	12	2.1	.5	w201275
w201276	7	.1	98	42	30L	.30	2.3	3.1	1.3	.2	w201276
w201277	11	.2	200	7	39	3.8	8.0	7.0	1.7	.2	w201277
w201278	9	.1	96	18	30L	.90	2.7	5.3	1.1	.2	w201278
w201279	25	.5	500	5	55	2.4	13	6.1	5.0	.8	w201279
w201280	12	.4	100	4	20L	.80	4.4	4.1	2.6	.6	w201280
w201281	29	.2	100	6	30L	.70	6.9	8.6	3.1	.4	w201281

Table 5g.--Content of 22 trace elements in 132 bituminous coal samples from Pennsylvania--continued

Sample number	Th (ppm)	U (ppm)	Yb (ppm)
w199693	3.0L	0.20L	0.7
w199694	3.0L	.20L	.5
w199695	3.0L	.20	.5
w199696	3.0L	.20L	.4
w199697	3.0L	.20L	.2
w199698	3.0L	1.4	.9
w199703	3.0L	1.9	1.1
w199704	3.0L	.20L	1.5L
w199705	3.0L	2.6	2.5
w199706	3.0L	.20L	.4
w199707	3.0L	.30	1.2
w199708	8.0	2.2	1.9
w199709	3.0L	1.3	.6
w199710	3.0L	.20L	.4
w199711	3.0L	.20L	.6
w199712	4.0	.40	1.2
w199713	3.0L	.20L	.9
w199714	3.0L	.20L	.6
w199715	3.0L	.20L	.5
w199716	3.0L	.20L	.6
w199729	3.0L	2.2	.5
w199730	3.0L	.20L	.4
w199731	3.0L	.70	.9
w199732	5.0	1.1	1.0
w199733	10	4.0	1.5
w199734	11	2.1	2.1
w199735	3.0L	.30	.6
w199736	3.0L	.90	1.2
w199737	6.0	1.2	1.4
w199738	3.0L	.20L	.7
w199739	3.0L	.90	1.1
w199740	3.0L	.60	1.0
w201274	5.0	1.7	2.4
w201275	3.0L	.40	1.3
w201276	3.0L	.50	.5
w201277	5.0	1.9	1.3
w201278	3.0L	1.5	.7
w201279	11	6.3	2.9
w201280	3.0L	1.1	2.4
w201281	4.0	2.1	1.3

Table 5g.--Content of 22 trace elements in 132 bituminous coal samples from Pennsylvania--continued

Sample number	As (ppm)	Ce (ppm)	Cl (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	Sample number
w201282	3.0	32	600	8.2	22	0.3L	0.45	45	1.8	0.050	w201282
w201283	2.0	51	580	5.2	56	.3	.70	56	2.7	.32	w201283
w201284	12	35	580	13	34	.3L	.63	22	2.3	.68	w201284
w201285	37	19	1,000	3.5	12	.3	.36	46	.5	.43	w201285
w201286	1.0	21	680	5.4	16	.2L	.29	52	.6	.060	w201286
w201287	2.0	17	740	8.6	9.7	.1	.38	20L	.3	.21	w201287
w200449	8.0	28	520	4.3	33	.8	.42	25	1.8	.20	w200449
w200450	4.0	21	610	5.0	22	.5	.34	20L	.8	.14	w200450
w200451	11	31	580	6.1	41	1.4	.65	46	1.7	.12	w200451
w196592	4.0	.4	B	7.3	29	1.2	.87	150	2.7	.38	w196592
w196593	3.0	49	B	5.8	24	1.3	1.5	96	3.0	.20	w196593
w196594	3.0	35	B	7.2	20	.5	.67	220	.9	.050	w196594

Table 5g.--Content of 22 trace elements in 132 bituminous coal samples from Pennsylvania--continued

Sample number	La (ppm)	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Sample number
w201282	18	0.2	98	3	30L	1.0	5.6	5.5	2.3	0.4	w201282
w201283	30	.3	96	16	30L	.70	9.2	14	3.6	.4	w201283
w201284	20	.3	100	11	30L	.60	5.1	7.8	2.9	.4	w201284
w201285	10	.1	99	19	30L	.50	2.5	5.4	1.6	.2	w201285
w201286	13	.1	100	9	20L	.30	2.9	3.4	1.5	.2	w201286
w201287	8	.1	100	2	20L	.80	2.6	4.6	1.7	.3	w201287
w200449	17	.2	210	12	60L	.50	5.7	9.7	2.1	.3	w200449
w200450	12	.1	100	9	55L	.40	4.1	7.9	1.7	.2	w200450
w200451	17	.3	200	17	65L	1.3	9.6	8.2	2.9	.6	w200451
w196592	26	.2	1,100	280	47L	.50	4.9	1.4	3.8	.7	w196592
w196593	21	.4	1,000	87	36L	1.9	6.3	2.7L	6.2	1	w196593
w196594	20	.1	200	720	29L	1.3L	3.1	1.2	2.9	.5	w196594

Table 5g.--Content of 22 trace elements in 132 bituminous coal samples from Pennsylvania--continued

Sample number	Th (ppm)	U (ppm)	Yb (ppm)
w201282	3.0L	1.5	1.4
w201283	12	2.8	1.7
w201284	8.0	2.2	1.8
w201285	3.0L	.90	.7
w201286	3.0L	.90	.5
w201287	3.0L	.80	.7
w200449	10	2.3	1.1
w200450	7.0	1.2	.7
w200451	8.0	4.0	1.7
w196592	4.0	1.4	1.3
w196593	3.0L	1.7	2.8
w196594	3.0L	1.3	.9

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis.

[Values in percent or parts-per-million. 22 values are from direct determinations on whole-coal; all other values calculated from analyses of ash. S means analysis by emission spectography; L, less than the value shown; N, not detected; B, not determined.]

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w199581	5.3	3.4	0.11	0.13	0.040	0.58	2.8	0.24	0.05	80	w199581
w199582	2.9	1.7	.061	.044	.020	.20	1.2	.080	.04	40	w199582
w199583	.88	.70	.094	.025	.010	.063	3.8	.023	.03	120	w199583
w199584	2.0	1.7	.062	.019	.010	.10	.32	.073	.03	19	w199584
w199585	4.0	2.1	.066	.058	.020	.27	.42	.11	.09	9.0	w199585
w199586	1.6	1.4	.27	.065	.030	.16	.43	.041	.09	3.0L	w199586
w199587	2.6	1.7	.061	.041	.010	.19	.84	.072	.03	5.0	w199587
w199588	.65	.44	.19	.042	.010	.047	.15	.023	.05	1.0	w199588
w199589	2.7	1.4	.058	.033	.020	.15	1.1	.078	.05	20	w199589
w199590	2.1	1.2	.10	.033	.020	.11	2.1	.10	.03	51	w199590
w199591	2.6	1.6	.086	.062	.020	.24	.91	.072	.04	17	w199591
w199592	3.7	2.1	.065	.059	.020	.29	.83	.12	.09	12	w199592
w199593	2.0	1.5	.080	.033	.010	.15	.28	.067	.02	2.0	w199593
w199594	2.3	1.5	.095	.043	.030	.24	5.5	.087	.07	170	w199594
w199595	.81	.77	.13	.037	.010	.098	.39	.039	.07	2.0	w199595
w199596	2.8	2.2	.063	.023	.010	.13	.096	.12	.03	1.0	w199596
w199597	1.6	.95	.082	.020	.010	.057	1.5	.064	.06	65	w199597
w199598	1.4	1.1	.071	.032	.010	.12	.24	.056	.01	2.0	w199598
w199599	2.5	1.5	.079	.048	.030	.29	2.5	.087	.04	20	w199599
w199600	1.4	1.2	.087	.024	.010	.080	1.8	.068	.03	67	w199600
w199601	.60	.47	.078	.020	.010	.038	2.5	.021	.03	61	w199601
w199602	4.5	4.1	.056	.074	.040	.59	.48	.22	.48	14	w199602
w199603	2.8	2.3	.067	.034	.010	.22	.13	.12	.05	1.0	w199603
w199604	.86	.59	.055	.021	.010	.050	.51	.021	.05	25	w199604
w199605	3.3	2.1	.14	.050	.020	.19	2.3	.12	.07	30	w199605
w199606	3.5	2.0	.10	.077	.020	.37	.75	.10	.01L	7.0	w199606
w199607	1.3	1.4	.075	.015	.010	.051	.46	.036	.04	1.0	w199607
w199608	2.3	1.7	.092	.083	.020	.37	.67	.063	.01L	1.0	w199608
w199609	2.6	1.6	.13	.044	.080	.18	.25	.12	.01L	4.0	w199609
w199610	3.4	2.1	.084	.061	.020	.35	1.4	.13	.06	45	w199610
w199611	2.8	2.0	.058	.050	.020	.27	1.3	.10	.03	17	w199611
w199612	3.6	2.2	.094	.084	.030	.41	2.1	.12	.05	110	w199612
w199613	1.9	1.1	.050	.043	.020	.21	1.2	.064	.03	69	w199613
w199614	2.7	1.7	.089	.051	.020	.21	1.7	.12	.09	47	w199614
w199717	2.3	1.6	.13	.039	.020	.17	.20	.10	.02	2.0	w199717
w199718	1.9	1.4	.29	.061	.020	.27	1.2	.050	.05	19	w199718
w199719	1.1	.60	.075	.021	.010	.072	3.2	.083	.05	81	w199719
w199720	2.6	1.8	.075	.036	.020	.16	.60	.14	.02	4.0	w199720
w199721	3.0	1.6	.088	.049	.020	.25	3.8	.075	.02L	22	w199721
w199722	.43	.25	.075	.008	.010	.011	5.4	.015	.07	17	w199722

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Cl (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Sample number
w199581	7.7	200	2.2	0.05	32	380	5.6	33	3.2	18	w199581
w199582	3.4	34	1.3	.09	20	670	18	18	1.5	15	w199582
w199583	.9L	29	3.0	.09	12	1,000	5.9	6.1	.3	12	w199583
w199584	4.4	51	1.1	.02	20	500	2.0	21	.5	4.9	w199584
w199585	7.0	35	1.5	.17	23	600	7.2	25	1.9	20	w199585
w199586	4.2	95	7.6	.33	40	500	12	19	.6	43	w199586
w199587	4.1	33	1.4	.08	17	600	8.4	17	1.2	13	w199587
w199588	1.4	53	5.3	.05	6.0	700	4.6	4.9	.2	3.5	w199588
w199589	4.0	22	1.5	.09	16	680	7.3	17	.9	13	w199589
w199590	2.2	36	2.0	.06	20	720	6.1	15	.4	12	w199590
w199591	5.0	43	3.4	.02	18	1,100	11	12	.8	11	w199591
w199592	6.9	64	3.9	.10	20	900	10	28	1.9	20	w199592
w199593	9.5	82	1.6	.03	10	1,800	7.2	20	.8	15	w199593
w199594	2.8	33	2.3	.09	16	580	17	17	.8	16	w199594
w199595	2.6	66	1.7	.23	5.0	260	4.6	8.9	.3	35	w199595
w199596	5.9	47	1.4	.02	22	370	6.4	22	.6	7.8	w199596
w199597	2.9	19	2.1	.06	13	1,900	8.8	13	.3	17	w199597
w199598	3.9	20	1.6	.02	10	1,500	2.8	14	.8	7.4	w199598
w199599	3.8	62	2.8	.04	24	760	5.2	16	1.3	30	w199599
w199600	3.0	17	1.7	.03	18	1,200	2.2	14	.5	8.7	w199600
w199601	.6L	19	1.7	.05	5.0	1,000	8.2	3.7	.3	11	w199601
w199602	9.7	81	3.8	.34	46	400	34	47	3.3	130	w199602
w199603	4.3	43	3.8	.02	27	400	14	20	1.6	19	w199603
w199604	22	14	2.9	.20	15	1,800	4.4	7.6	.4	28	w199604
w199605	30	150	2.8	.07	31	1,300	4.8	21	.9	20	w199605
w199606	26	340	4.1	.03	41	460	6.4	21	1.8	12	w199606
w199607	14	10	2.2	.19	16	1,600	13	15	.3	8.4	w199607
w199608	16	41	3.4	.06	18	1,200	29	17	1.1	26	w199608
w199609	16	78	1.5	.04	20	850	4.0	17	.9	8.4	w199609
w199610	7.3	77	4.8	.13	24	810	6.2	26	1.9	24	w199610
w199611	4.9	42	1.9	.06	27	1,000	5.7	24	1.8	13	w199611
w199612	6.3	88	2.7	.10	29	1,200	14	29	2.0	17	w199612
w199613	3.6	62	1.2	.04	14	830	5.4	15	1.1	8.1	w199613
w199614	5.8	32	2.4	.17	19	1,600	7.1	21	1.5	19	w199614
w199717	7.7	71	2.1	.08	32	1,100	4.6	17	.9	16	w199717
w199718	7.3	77	2.0	.02	14	430	4.1	15	1.5	19	w199718
w199719	2.1	18	2.0	.06	9.0	1,400	8.7	12	.6	11	w199719
w199720	5.9	99	2.8	.03	27	520	6.2	20	1.0	15	w199720
w199721	5.8	28	1.9	.06	16	1,300	7.3	13	.9	11	w199721
w199722	9.6	4	1.8	.06	8.0	1,200	5.7	5.9	1.5L	32	w199722

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	Ho-S (ppm)	Sample number
w199581	5.5L	2.5L	0.50	44	9.9	1.7L	9.9	1.9	0.70	1.7L	w199581
w199582	2.7L	1.2L	.36	26	3.9	1.2	1.3	.8	.42	.85L	w199582
w199583	2.1L	.9L	.45	20L	14	1.7	9.4	.8L	.44	.66L	w199583
w199584	1.9L	.9L	.37	56	3.1	.96	.26	.7	.54	.61L	w199584
w199585	3.2L	1.5L	.38	42	5.4	1.5	6.4	1.0	.13	1.0L	w199585
w199586	4.1	3.4	1.3	44	3.6	4.3	1.6	.6	.45	1.3	w199586
w199587	2.4L	1.1L	.32	26	3.3	1.3	1.5	.7	.080	.76L	w199587
w199588	1.5	1.4	.35	28	8.4	1.2	8.4	.3	.64	.46	w199588
w199589	2.4L	1.1L	.33	38	3.8	.98	2.0	.6	.29	.76L	w199589
w199590	2.4L	1.1L	.31	42	6.1	1.2	2.6	.8	.68	.76L	wi99590
w199591	2.4L	1.1L	.36	54	6.1	1.1	4.0	.5	.26	.76L	w199591
w199592	3.1L	1.9	.49	110	8.0	1.7	5.6	1.0	.24	1.0L	w199592
w199593	1.9L	.9L	.53	26	5.1	1.5	8.3	.6	.050	1.3L	w199593
w199594	3.7L	1.7L	.38	20L	8.0	3.2	8.0	.7	1.7	1.2L	w199594
w199595	1.0L	.9	.14	20L	4.1	1.0	1.6	.3	.27	.71L	w199595
w199596	2.5L	1.1L	.33	26	4.8	1.8	.46	1.0	.070	.80L	w199596
w199597	1.8L	.8L	.31	20L	6.6	.57L	4.2	.5	.18	.57L	w199597
w199598	1.4L	.8	.34	28	3.7	.81	1.1	.5	.010	.43L	w199598
w199599	3.6	1.7	.47	24	7.9	2.2	3.4	.7	.14	.92L	w199599
w199600	1.9L	.9L	.39	20L	4.2	1.7	5.2	.6	.24	.61L	w199600
w199601	1.4L	.6L	.24	28	3.0	1.3	3.6	.2	.52	.45L	w199601
w199602	4.4L	2.0L	.75	56	14	2.2	13	2.1	.40	1.4L	w199602
w199603	2.2	1.3	.45	44	6.0	1.6	3.4	.9	.060	.81L	w199603
w199604	1.2	.5	.54	20L	6.5	.77	9.9	.2	.090	.39	w199604
w199605	3.7L	1.7L	.61	130	6.5	2.2	1.3	1.0	.32	1.2L	w199605
w199606	3.1L	1.4L	.48	72	8.3	1.6	5.7	.9	.10	1.0L	w199606
w199607	1.8	.7L	.44	20L	5.7	.91	3.6	.3	.020	.49L	w199607
w199608	2.8	1.5	.58	42	12	1.7	6.6	.5	.010L	.75	w199608
w199609	2.3L	1.0L	.31	56	4.3	1.1	1.8	1.0	.26	.72L	w199609
w199610	3.3L	1.5L	.45	42	8.9	1.8	5.4	1.1	.35	1.0L	w199610
w199611	2.8	1.3L	.47	38	5.8	1.7	1.2	.9	.26	.90L	w199611
w199612	3.7L	1.7L	.52	54	9.3	2.2	5.4	1.0	.57	1.2L	w199612
w199613	2.0L	.9L	.24	36	4.0	.80	4.9	.6	.51	.62L	w199613
w199614	2.8L	1.3L	2.0L	20L	6.5	1.4	6.0	.9	.35	.90L	w199614
w199717	2.1L	1.4	.50	28	4.4	1.5L	.19	1.0	.060	.68L	w199717
w199718	2.3L	1.1L	.40	56	14	1.6L	16	.6	.56	.74L	w199718
w199719	1.9L	.9L	.53	21	6.7	1.3L	2.9	.3	.50	.61L	w199719
w199720	2.4L	1.1L	.42	20L	5.7	1.7L	2.3	1.2	.13	.77L	w199720
w199721	3.5L	1.6L	.36	40	5.1	2.4L	3.3	.5	.50	1.1L	w199721
w199722	2.1L	1.0L	.19	20L	3.9	1.4L	.67	.7L	.13	.67L	w199722

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	P (ppm)	Pb (ppm)	Sample number
w199581	18	87	0.3	32	2.5	3.5	11L	14	54	17	w199581
w199582	10	18	.2	3.9	5.0	1.6	8.3	17	10	6.7	w199582
w199583	5	6.7	.4	41	3.9	1.1	4.4	9.3	5	7.1	w199583
w199584	12	20	.1	7.3	2.2	1.1	6.3	5.0	29	8.4	w199584
w199585	12	25	.2	8.3	4.8	1.6	7.3	16	11	9.6	w199585
w199586	19	6.5	.8	58	2.0	.77	17	28	3	37	w199586
w199587	10	19	.1	8.2	4.9	1.7	7.1	13	6	5.2	w199587
w199588	3	2.5	.2	21	1.7	.39	2.9	20	1	15	w199588
w199589	9	17	.1	5.3	6.1	1.3	5.0	13	6	6.3	w199589
w199590	11	16	.2	14	.55	1.7	5.7	3.4	14	5.2	w199590
w199591	9	20	.2	14	2.0	1.1	8.3	14	14	7.2	w199591
w199592	10	37	.3	8.6	6.4	3.4	9.2	24	10	14	w199592
w199593	5	23	.2	86	5.2	1.5	6.7	28	6	8.2	w199593
w199594	8	13	.2	16	5.3	1.7	7.7L	14	11	8.4	w199594
w199595	3	3.5	.1	24	1.5	1.1	2.3	31	1	2.8	w199595
w199596	13	26	.1	4.8	1.0	3.6	13	19	6	13	w199596
w199597	8	11	.1	6.9	3.2	.90	4.3	27	6	15	w199597
w199598	5	15	.2	11	.99	.74	4.7	4.3	3	3.3	w199598
w199599	14	18	.3	16	4.1	3.4	10	8.8	19	11	w199599
w199600	9	19	.2	6.7	2.2	2.0	7.3	3.4	6	3.5	w199600
w199601	3	4.2	.1	14	2.8	.51	2.9L	7.0	3	4.4	w199601
w199602	25	77	.3	12	4.8	3.4	16	55	18	46	w199602
w199603	15	32	.2	6.0	.70	2.0	9.5	23	7	19	w199603
w199604	8	3.7	.2	5.6	3.3	.34	4.3	13	4	7.7	w199604
w199605	17	27	.2	6.6	1.5	2.3	11	22	180	18	w199605
w199606	22	27	.2	6.0	1.1	2.4	13	16	82	16	w199606
w199607	10	34	.2	2.1	1.2	.77	5.8	26	4	4.4	w199607
w199608	9	350	.3	54	.96	1.3	8.3	41	12	11	w199608
w199609	11	16	.2	26	.62	2.3	7.0	4.8	37	6.6	w199609
w199610	13	40	.2	8.2	1.6	2.1	9.5	18	21	15	w199610
w199611	13	31	.1	7.7	6.7	1.9	9.6	11	7	8.2	w199611
w199612	16	29	.2	15	3.2	2.0	7.8L	22	49	14	w199612
w199613	7	8.9	.1	7.7	4.1	.98	4.1L	13	6	8.9	w199613
w199614	10	20	.2	8.3	2.2	1.7	5.9L	14	8	19	w199614
w199717	19	34	.2	29	.97	1.7	9.7	11	29	9.7	w199717
w199718	8	19	.3	250	1.5	.32	4.9L	14	13	28	w199718
w199719	4	3.7	.2	12	7.4	.61	5.1	9.6	3	5.7	w199719
w199720	16	42	.2	5.9	1.7	2.1	7.5	15	14	7.7	w199720
w199721	8	12	.1	33	1.9	1.3	7.3L	16	6	12	w199721
w199722	3	2.2	.1	55	1.4	.96	4.4L	11	2	1.9L	w199722

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	Pr-S (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Ta-S (ppm)	Tb (ppm)	Sample number
w199581	17L	47	1.7	9.7	2.5	2.6	0.50L	120	110L	0.3	w199581
w199582	8.3L	21	.50	3.6	3.5	1.9	.24L	38	56L	.3	w199582
w199583	6.4L	40L	2.8	8.8	6.4	2.0	.85	44	43L	.6	w199583
w199584	5.9L	30L	.70	4.7	1.5	1.9	.61	96	40L	.3	w199584
w199585	9.9L	31	1.2	5.4	2.3	2.1	.87	26	67L	.3	w199585
w199586	5.8L	40L	.90	8.8	3.1	6.3	.17L	58	40L	1	w199586
w199587	7.4L	23	.50	3.3	1.5	1.7	.22	27	50L	.3	w199587
w199588	2.4L	30L	1.7	4.5	7.1	1.2	.07	77	16L	.4	w199588
w199589	7.4L	70L	.70	3.1	2.3	1.6	.22L	25	50L	.3	w199589
w199590	7.4L	70L	.90	4.0	8.1	1.6	.22L	120	50L	.8L	w199590
w199591	7.4L	60L	.80	4.3	3.7	1.7	.22L	100	50L	.3	w199591
w199592	9.7L	70L	2.5	6.6	2.1	2.0	.29L	70	66L	.3	w199592
w199593	5.8L	50L	4.0	4.0	1.6	2.1	.52	35	40L	.4	w199593
w199594	11L	70L	2.7	5.3	2.8	1.6	.33L	20	77L	.3	w199594
w199595	3.2L	40L	.30	2.1	3.9	.60	.09L	41	22L	.2	w199595
w199596	7.8L	50L	.40	3.8	3.4	1.8	.57	83	52L	.2	w199596
w199597	5.6L	60L	1.6	2.8	1.8	1.3	.16	68	38L	.7L	w199597
w199598	4.2L	50L	.30	2.9	1.0	1.5	.43	33	29L	.3	w199598
w199599	9.0L	70L	2.3	7.8	3.4	2.1	.26L	88	61L	.5	w199599
w199600	5.9L	50L	1.4	3.2	7.4	1.8	.17L	36	40L	.3	w199600
w199601	4.4L	50L	1.6	1.9	6.3	.90	.13L	35	29L	.6L	w199601
w199602	14L	64	3.7	10	13	4.0	1.8	65	93L	.4	w199602
w199603	7.9L	40L	1.6	5.2	3.7	2.5	.58	77	53L	.3	w199603
w199604	2.9L	30L	4.4	5.7	2.3	2.2	.09L	69	20L	.4	w199604
w199605	11L	40L	.60	4.3	4.2	3.1	.33L	530	76L	.4	w199605
w199606	9.7L	25	1.7	4.5	1.3	2.8	.29L	410	66L	.2	w199606
w199607	4.8L	30L	.70	2.9	5.0L	2.1	.14L	49	32L	.4	w199607
w199608	7.3L	26	2.4	7.8	2.1	2.4	.21	61	49L	.5	w199608
w199609	7.0L	40L	.30	4.2	5.5	1.6	.72	250	47L	.2	w199609
w199610	10L	34	2.0	5.3	3.4	2.3	.30L	130	69L	.4	w199610
w199611	8.7L	29	.90	4.2	1.0	2.6	.26L	38	59L	.3	w199611
w199612	11L	44	2.9	5.5	2.9	2.6	.34L	110	78L	.3	w199612
w199613	6.1L	40L	2.3	2.9	2.1	1.2	.18L	36	41L	.2	w199613
w199614	8.7L	40L	1.7	3.9	5.7	1.8	.26L	51	59L	.8L	w199614
w199717	6.6L	30L	.80	4.0	4.1	2.6	.87	220	45L	.4	w199717
w199718	7.2L	23	5.5	7.9	6.5	1.7	.21L	47	49L	.4	w199718
w199719	5.9L	30L	.90	3.1	2.9	1.9	.17L	39	40L	.4	w199719
w199720	7.5L	45L	1.1	4.5	2.1	2.0	.55	110	51L	.3	w199720
w199721	11L	45L	.60	2.5	1.5	1.6	.32L	44	73	.3	w199721
w199722	6.5L	40L	.50	1.3	6.8	.90	N	28	44L	.2	w199722

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	Th (ppm)	Tl-S (ppm)	Tm-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w199581	4.0	0.74L	1.2L	3.7	30	7.9	1.8	18	27	w199581
w199582	3.0L	.37L	.61L	1.5	17	6.2	1.0	23	12	w199582
w199583	3.0L	.28L	.47L	4.6	12	9.4	2.2	10	3.6	w199583
w199584	3.0L	.26L	.44L	1.7	30	4.3	.8	12	9.6	w199584
w199585	3.0L	.44L	.73L	5.6	30	5.1	1.0	35	13	w199585
w199586	3.0L	.26L	.60	1.7	18	28	4.2	64	15	w199586
w199587	3.0L	.33L	.55L	1.3	15	7.2	.8	24	17	w199587
w199588	3.0L	.11L	.25	.90	8.8	11	1.2	11	5.3	w199588
w199589	3.0L	.33L	.55L	1.7	16	4.7	.8	21	6.2	w199589
w199590	3.0L	.33L	.55L	1.2	8.3	5.1	1.0	11	16	w199590
w199591	3.0L	.33L	.55L	1.7	20	7.0	1.1	10	8.0	w199591
w199592	3.0L	.43L	.72L	2.1	33	14	1.6	23	26	w199592
w199593	3.0L	.26L	.43L	1.3	20	13	1.2	14	15	w199593
w199594	3.0L	9.7	.84L	1.3	13	8.0	1.7	7.7	16	w199594
w199595	3.0L	.14L	.24L	1.2	13	7.5	.8	39	15	w199595
w199596	3.0L	.34L	.57L	1.6	25	9.7	.7	10	56	w199596
w199597	3.0L	.25L	.41L	1.5	11	3.6	.6	12	6.5	w199597
w199598	3.0L	.19L	.31L	1.5	12	5.6	.8	13	6.2	w199598
w199599	3.0L	.40L	.66L	3.9	26	17	2.0	12	41	w199599
w199600	3.0L	.26L	.44L	1.2	16	8.7	1.1	18	22	w199600
w199601	3.0L	.19L	.32L	.80	3.0	4.7	.7	8.3	3.1	w199601
w199602	6.0	.81	1.0L	4.8	79	9.1	1.6	36	24	w199602
w199603	3.0L	.35L	.58L	2.5	37	9.9	1.1	9.2	15	w199603
w199604	3.0L	.13L	.22L	1.4	13	5.2	1.2	110	3.5	w199604
w199605	3.0L	4.2	.83L	1.6	17	8.5	1.2	14	18	w199605
w199606	3.0L	.43L	.72L	1.3	20	11	1.3	14	29	w199606
w199607	3.0L	.21L	.35L	1.1	11	7.0	1.0	43	6.6	w199607
w199608	3.0L	.32L	.54L	1.7	24	13	2.0	24	10	w199608
w199609	3.0L	.31L	.52L	1.1	16	6.9	.9	8.5	18	w199609
w199610	3.0L	.45L	.75L	3.0	27	11	1.4	19	24	w199610
w199611	3.0L	.38L	.64L	1.7	19	7.4	.9	20	18	w199611
w199612	3.0L	.51L	.85L	2.1	20	6.1	1.2	30	11	w199612
w199613	3.0L	1.4	.45L	1.2	9.8	2.2	.7	14	6.8	w199613
w199614	3.0L	.38L	.64L	2.7	17	4.2	.9	31	12	w199614
w199717	3.0	.29L	.49L	.60	17	6.5	1.0	9.6	13	w199717
w199718	3.0L	.32L	.53L	2.1	16	3.5	1.5	16	7.4	w199718
w199719	3.0L	.26L	.44L	.30	7.7	8.1	1.4	17	5.7	w199719
w199720	5.0	.33L	.55L	.40	20	5.2	1.1	7.4	13	w199720
w199721	3.0L	.47L	.79L	.30	12	5.8	.8	30	12	w199721
w199722	3.0L	.29L	.48L	1.1	13	4.1	.5	12	4.6	w199722

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w199723	0.54	0.34	0.064	0.010	0.010	0.016	4.7	0.018	0.08	23	w199723
w199724	2.1	1.9	.13	.030	.010	.078	.19	.068	.19	16	w199724
w199725	3.4	3.0	.080	.023	.020	.078	6.1	.067	.23	24	w199725
w199726	2.6	2.1	.10	.035	.020	.16	2.7	.11	.10	18	w199726
w199727	2.8	1.2	.069	.023	.020	.11	1.9	.14	.06	47	w199727
w199728	.84	.69	.058	.013	.010	.032	.66	.026	.06	35	w199728
w199423	1.3	.82	.30	.039	.050	.067	1.8	.037	.01L	4.0	w199423
w199424	1.6	.87	.22	.046	.090	.071	1.3	.056	.01L	3.0	w199424
w199660	1.7	.91	.090	.024	.010	.13	7.6	.051	.09	14	w199660
w199661	.98	.87	.12	.013	.010	.025	2.9	.026	.07	3.0	w199661
w199662	2.7	1.3	.069	.047	.020	.18	2.3	.12	.04	45	w199662
w199663	2.6	2.0	.086	.043	.020	.15	2.6	.074	.07	29	w199663
w199664	3.6	2.2	.16	.061	.020	.27	4.7	.11	.06	23	w199664
w199665	2.6	1.9	.15	.044	.030	.19	1.6	.15	.04	21	w199665
w199666	2.0	1.5	.055	.042	.010	.21	.14	.069	.03	1.0	w199666
w199667	1.2	1.1	.071	.022	.020	.071	2.7	.039	.06	22	w199667
w199668	3.6	1.9	.14	.029	.009	.21	5.8	.19	.06	21	w199668
w199669	2.7	1.8	.057	.038	.020	.23	2.6	.081	.04	42	w199669
w199670	2.7	1.8	.074	.038	.020	.23	1.5	.10	.04	73	w199670
w199671	3.3	1.9	.046	.052	.020	.32	.81	.12	.10	10	w199671
w199672	.79	.71	.054	.008	.010	.026	.89	.018	.05	69	w199672
w199673	4.6	2.6	.050	.076	.030	.43	1.9	.15	.15	21	w199673
w199674	2.4	2.5	.060	.016	.010	.11	.15	.28	.08	1.0	w199674
w199675	3.6	2.2	.063	.061	.020	.35	.28	.11	.15	5.0	w199675
w199676	2.0	1.6	.097	.024	.010	.10	2.1	.061	.06	3.0	w199676
w199677	2.4	2.4	.16	.015	.010	.064	.35	.28	.06	2.0	w199677
w199678	.61	.48	.12	.011	.010	.024	1.6	.021	.03	11	w199678
w199679	4.3	2.7	.029	.042	.020	.21	1.8	.23	.17	69	w199679
w199680	1.9	1.4	.084	.015	.010	.048	.94	.12	.07	9.0	w199680
w199681	5.3	4.7	.32	.042	.021	.15	6.6	.14	.19	6.0	w199681
w199682	1.9	1.4	.074	.027	.020	.12	2.8	.051	.06	67	w199682
w199683	1.7	1.3	.072	.026	.030	.14	13	.056	.01	2.0	w199683
w199684	12	6.0	.050	.19	.049	.84	2.8	.29	.13	67	w199684
w199685	3.3	2.7	.053	.046	.020	.16	5.8	.065	.15	46	w199685
w199686	2.0	1.3	.062	.033	.020	.17	1.0	.065	.06	61	w199686
w199687	4.9	3.1	.067	.062	.019	.32	1.5	.17	.06	22	w199687
w199689	2.9	1.9	.079	.029	.020	.15	.087	.12	.08	2.0	w199689
w199690	9.0	5.2	.087	.22	.059	.92	3.2	.30	.04	54	w199690
w199691	3.6	1.7	.10	.046	.020	.22	3.0	.17	.03	7.0	w199691
w199692	5.3	2.6	.12	.069	.029	.38	.71	.19	.04	2.0	w199692

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Cl (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Sample number
w199723	80	7	4.1	0.02	6.0	1,600	12	5.3	1.0L	12	w199723
w199724	3.0	44	2.7	.03	24	1,000	3.2	33	.4	12	w199724
w199725	55	80	1.8	.69	32	970	84	47	.4	37	w199725
w199726	3.1	56	1.6	.11	35	790	6.1	36	1.1	21	w199726
w199727	30	74	2.7	.04	21	1,200	1.5	19	.4	13	w199727
w199728	1.3	11	1.8	.06	5.0	1,100	5.2	6.7	1.0L	8.6	w199728
w199423	41	35	.6	.06	9.0	B	2.8	9.3	.4	4.8	w199423
w199424	55	59	.5	.07	8.0	B	1.3	7.9	.5	5.1	w199424
w199660	28	23	7.0	.08	10	640	5.0	11	.3	8.8	w199660
w199661	30	28	1.0	.08	16	1,500	5.3	11	.2	8.7	w199661
w199662	45	34	2.1	.04	9.0	980	1.4	12	.9	5.3	w199662
w199663	4.6	27	2.6	.19	13	860	5.5	22	.8	14	w199663
w199664	9.4	78	3.1	.16	34	490	4.2	23	1.3	14	w199664
w199665	13	89	1.1	.04	19	550	2.7	20	1.0	12	w199665
w199666	6.1	71	2.1	.03	15	740	12	13	1.0	15	w199666
w199667	3.9	34	1.5	.09	10	810	2.8	9.0	.3	12	w199667
w199668	28	100	4.5	.04	40	530	2.4	29	.6	15	w199668
w199669	6.1	40	1.7	.11	14	440	9.2	20	.8	11	w199669
w199670	7.9	140	3.4	.06	21	580	6.5	23	.8	9.1	w199670
w199671	10	66	4.5	.17	37	410	16	39	1.5	16	w199671
w199672	100	12	1.9	.05	9.0	1,400	2.5	6.0	.3	8.1	w199672
w199673	14	85	4.2	.35	41	430	26	41	1.7	29	w199673
w199674	13	130	2.4	.08	47	140	7.1	30	.3	24	w199674
w199675	12	110	4.2	.07	29	490	8.1	30	1.7	13	w199675
w199676	37	33	2.9	.18	51	1,100	21	18	.7	17	w199676
w199677	12	110	1.7	.09	45	160	4.4	31	.2	16	w199677
w199678	75	14	1.9	.02	6.0	1,700	1.2	6.0	.1	5.5	w199678
w199679	9.4	59	2.8	.06	28	220	3.1	38	1.6	20	w199679
w199680	5.9	32	1.7	.07	24	1,300	16	18	.2	17	w199680
w199681	100	130	4.7	.63	40	1,100	32	27	.7	51	w199681
w199682	5.3	32	2.1	.08	15	590	14	14	.6	7.3	w199682
w199683	10	50	2.1	.03	16	730	3.4	11	.7	2.7	w199683
w199684	27	200	5.3	.48	76	130	22	48	3.0	27	w199684
w199685	8.1	76	6.4	.21	97	330	14	45	.9	23	w199685
w199686	7.8	32	1.9	.06	15	740	7.9	15	.9	8.9	w199686
w199687	14	78	3.0	.11	27	680	9.4	27	2.5	14	w199687
w199689	9.5	160	3.6	.11	33	600	13	22	.9	26	w199689
w199690	33	190	3.4	.08	47	200	3.7	46	5.8	22	w199690
w199691	35	53	5.3	.02	16	1,000	2.6	16	.9	10	w199691
w199692	58	68	2.4	.02L	75	700	1.8	27	2.4	20	w199692

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	Ho-S (ppm)	Sample number
w199723	2.0L	0.9L	0.21	20L	9.8	2.4	4.1	0.7L	0.56	0.62L	w199723
w199724	2.1L	.9L	.40	26	14	1.4L	22	.6	1.5	.66L	w199724
w199725	5.0L	2.3L	.42	20	11	3.4	.46	.8	.77	1.6L	w199725
w199726	3.2L	1.5L	.59	52	9.1	2.2L	1.3	1.0	.38	1.0L	w199726
w199727	2.7L	1.2L	.35	49	7.7	1.8L	9.0	1.0	.37	.85L	w199727
w199728	1.0L	.5L	.12	23	4.0	.68L	3.1	.2	.090	.32L	w199728
w199423	1.8L	.8L	.18	120	2.2	1.1	.41	.4	.23	.57L	w199423
w199424	1.7L	.8L	.14	140	2.5	1.1	.31	.5	.070	.55L	w199424
w199660	3.9L	1.8L	.27	40	10	4.4	14	.4	.29	1.2L	w199660
w199661	1.9L	.9L	.27	20L	6.2	2.1	1.4	.7L	.11	.61L	w199661
w199662	2.8L	1.3L	.23	20L	5.9	2.5	.88	.8	.38	.88L	w199662
w199663	3.1L	1.4L	.47	20L	7.2	2.7	1.6	.7	.26	1.0L	w199663
w199664	4.5L	2.0L	.70	64	7.8	4.1	9.4	.9	.55	1.4L	w199664
w199665	2.8L	1.3L	.35	20L	5.5	1.9L	.25L	1.0	.26	.89L	w199665
w199666	1.8L	1.1	.30	40	6.1	1.3	2.0	.5	.010L	.57L	w199666
w199667	2.0L	.9L	.18	29	4.7	1.8	4.5	.3	.13	.64L	w199667
w199668	4.7L	2.1L	.59	36	7.4	4.9	2.8	1.3	.15	1.5L	w199668
w199669	3.0L	1.4L	.60	20L	7.0	2.9	.28L	.6	.26	.97L	w199669
w199670	2.8L	1.3	.36	32	11	2.3	3.4	.8	.30	1.9L	w199670
w199671	4.5	2.4	.72	44	16	3.9	7.3	1.1	.13	1.2	w199671
w199672	2.5	1.0	.38	20L	4.9	1.9	4.1	.3	.12	.41L	w199672
w199673	6.4	3.1	.88	20L	21	5.2	7.9	1.2	.35	1.9	w199673
w199674	2.6L	2.0	.70	29	11	1.7L	.23	2.2	.050	1.7L	w199674
w199675	4.6	1.4L	.69	40	20	2.9	6.9	1.1	.35	2.0L	w199675
w199676	4.6	2.8	1.4	20L	6.2	4.6	.23L	.6	.11	1.7	w199676
w199677	2.5L	1.4	.68	64	10	1.7L	.35	2.3	.12	1.7L	w199677
w199678	1.4	.9	.25	20L	3.6	1.4	1.4	.2	.10	.35L	w199678
w199679	4.0L	1.8L	.58	20L	20	2.8L	1.7	1.5	.59	1.3L	w199679
w199680	2.0L	1.2	.45	24	5.9	2.2	1.3	1.1	.36	.63L	w199680
w199681	7.0L	3.2L	.44	64	35	7.0	9.2	.8	.26	2.2L	w199681
w199682	2.6L	1.2L	.30	32	5.1	2.6	2.1	.5	.94	.81L	w199682
w199683	1.6L	.7L	.29	30	5.7	1.2	2.7	.5	.56	.50L	w199683
w199684	9.6L	4.4L	1.2	88	14	6.6L	12	2.2	.36	3.1L	w199684
w199685	7.2	2.1L	1.5	20L	20	6.4	36	1.1	.67	1.5L	w199685
w199686	2.0L	.9L	.36	26	5.9	1.5	1.4	.6	.15	.64L	w199686
w199687	4.4L	2.0L	.46	25	12	3.2	.80	1.5	.83	3.0L	w199687
w199689	2.5L	1.6	.50	110	9.9	1.9	7.9	1.0	.030	.79L	w199689
w199690	8.3L	3.8L	.64	92	17	5.7L	1.1	2.9	.30	2.7L	w199690
w199691	3.7L	1.7L	.27	42	5.8	2.8	.50	1.2	.17	1.2L	w199691
w199692	4.4L	2.8	1.1	72	5.4	4.8	.40L	1.7	.010	1.4L	w199692

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	P (ppm)	Pb (ppm)	Sample number
w199723	2	3.9	0.2	9.8	4.1	0.98	4.1L	27	2	32	w199723
w199724	17	25	.2	4.1	1.5	.85	7.3	20	16	5.8	w199724
w199725	19	69	.3	8.7	3.4	1.4	11L	64	98	22	w199725
w199726	19	29	.2	10	1.8	1.9	9.0	11	46	12	w199726
w199727	12	9.7	.2	18	1.3	3.5	5.6L	7.4	77	18	w199727
w199728	3	5.9	.1L	5.0	6.3	.41	2.1L	6.3	2	5.0	w199728
w199423	5	9.0	.1	22	.25	.49	3.8L	3.6	180	2.5	w199423
w199424	5	8.6	.1	14	.47	1.1	3.6L	5.1	17	2.1	w199424
w199660	5	8.1	.2	210	2.5	4.9	8.6	13	28	32	w199660
w199661	8	15	.1	12	1.0	.96	8.7	10	12	4.5	w199661
w199662	5	49	.1	9.5	2.5	6.1	8.0	6.4	7	9.0	w199662
w199663	5	40	.2	20	8.3	1.9	10	14	11	14	w199663
w199664	17	43	.2	35	5.9	5.7	22	14	180	5.9	w199664
w199665	11	34	.1	19	1.3	5.6	15	6.5	110	6.7	w199665
w199666	8	18	.1	6.4	11	2.2	12	25	14	6.3	w199666
w199667	4	17	.1	14	6.7	1.5	7.4	11	13	2.9	w199667
w199668	22	40	.2	34	5.1	9.1	25	8.7	240	45	w199668
w199669	5	18	.2	12	4.6	2.5	15	25	9	5.1	w199669
w199670	12	18	.2	10	3.0	3.0	14	34	56	4.0	w199670
w199671	18	17	.3	10	2.1	6.7	24	52	17	8.4	w199671
w199672	5	13	.1	3.8	5.6	.99	7.0	9.9	8	7.5	w199672
w199673	20	23	.3	12	3.1	8.7	29	85	35	13	w199673
w199674	26	28	.2	5.0	1.9	15	22	30	54	23	w199674
w199675	17	16	.3	53	2.4	3.4	20	45	20	7.6	w199675
w199676	22	40	.3	32	7.5	3.1	28	36	28	5.4	w199676
w199677	25	28	.3	4.9	2.3	9.2	15	15	100	14	w199677
w199678	2	7.0	.1	17	5.5	1.2	3.5	6.0	3	9.0	w199678
w199679	14	35	.3	8.5	6.1	6.6	13	20	21	11	w199679
w199680	12	16	.1	8.8	2.9	8.6	14	54	7	9.0	w199680
w199681	26	82	.2	22	7.3	3.8	32	66	480	24	w199681
w199682	7	14	.1	13	3.7	3.5	11	35	18	23	w199682
w199683	8	11	.1	40	2.2	1.7	10	10	7	2.0	w199683
w199684	39	88	.4	48	4.8	12	44	48	190	24	w199684
w199685	52	61	.4	18	12	3.0	38	70	72	28	w199685
w199686	6	12	.1	5.6	2.0	2.3	11	15	4	7.8	w199686
w199687	15	44	.2	7.2	2.0	9.4	20	17	7	9.6	w199687
w199689	18	32	.2	3.8	8.0	2.8	17	45	61	12	w199689
w199690	26	190	.3	45	.76L	7.6	26	17	280	14	w199690
w199691	10	43	.2	22	2.7	8.3	11	6.5	30	3.0	w199691
w199692	36	64	.3	15	.80	11	48	5.4	190	6.4	w199692

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	Pr-S (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Ta-S (ppm)	Tb (ppm)	Sample number
w199723	6.1L	40L	0.60	1.5	4.8	0.90	2.1	26	41L	0.2	w199723
w199724	6.4L	40L	.90	6.3	7.6	1.8	.94	110	43L	.4	w199724
w199725	16L	55L	.70	7.9	14	2.1	.46L	320	110L	.6	w199725
w199726	9.8L	45L	.70	7.7	5.7	2.7	.29	160	68L	.4	w199726
w199727	8.2L	50L	1.3	4.7	4.1	1.7	.36	570	56L	.3	w199727
w199728	3.1L	40L	1.4	1.3	1.8	.50	.14	30	21L	.3L	w199728
w199423	5.6L	43L	1.8L	1.9	1.6	.90	.16L	110	38L	.1	w199423
w199424	5.3L	50L	2.0L	1.6	1.4	.70	.16L	120	36L	.6L	w199424
w199660	12L	60L	.60	4.7	6.2	1.1	N	77	81L	.4	w199660
w199661	5.9L	50L	.20	2.8	1.6	1.0	N	87	40L	.2	w199661
w199662	8.5L	50L	.60	2.5	3.0	1.0	.25L	49	58L	.6L	w199662
w199663	9.7L	60L	.80	5.0	2.2	1.8	.29L	39	66L	.4	w199663
w199664	14L	70L	.80	5.7	3.3	2.9	.41L	370	94L	.4	w199664
w199665	19L	60L	.40	4.2	4.0	1.6	.25L	600	58L	.3	w199665
w199666	5.6L	60L	.60	2.9	1.4	1.3	.49	130	38L	.2	w199666
w199667	6.2L	50L	.90	2.7	3.2	.80	.18L	120	42L	.6L	w199667
w199668	14L	70L	.90	6.7	3.6	2.7	.42L	700	98L	.3	w199668
w199669	9.4L	33	.80	3.5	2.4	2.4	.28L	40	63L	.4	w199669
w199670	11	70L	.90	4.9	1.9	1.7	.25L	270	58L	.3	w199670
w199671	13	37	2.4	11	2.1	3.4	.26L	59	60L	.6	w199671
w199672	3.9L	50L	.70	1.5	1.5	1.1	N	130	27L	.4	w199672
w199673	13L	45	2.2	11	3.4	3.4	.39L	120	89L	.8	w199673
w199674	7.9L	60L	.90	6.9	9.0	3.1	2.0	190	53L	.5	w199674
w199675	9.2L	70L	1.6	9.4	2.5	2.6	1.6	110	63L	.7	w199675
w199676	18	60L	.30L	3.1	4.4	5.8	.23L	180	52L	.9	w199676
w199677	7.8L	50L	.60	5.9	8.4	3.0	1.3	180	53L	.5	w199677
w199678	3.4L	40L	.40	1.2	3.7	.90	N	60	23L	.2	w199678
w199679	13L	60L	1.7	7.5	14	2.4	.37L	44	85L	.5	w199679
w199680	14L	50L	.50	3.8	7.1	2.1	.18L	99	41L	.4	w199680
w199681	21L	70L	.40	6.6	11	2.1	.63L	920	150L	.8L	w199681
w199682	7.9L	50L	1.2	4.5	4.5	1.4	.23L	84	53L	.4	w199682
w199683	4.9L	50L	.30	3.0	7.0L	1.5	.72	79	33L	.3	w199683
w199684	30L	88	2.3	12	4.0	5.7	.88L	300	200L	.7	w199684
w199685	32L	80L	7.2	10	6.0	7.4	N	200	98L	1	w199685
w199686	6.2L	50L	.70	3.1	2.9	1.4	.18L	50	42L	.3	w199686
w199687	14L	33	.60	5.7	8.0	2.3	.40L	92	92L	.4	w199687
w199689	7.7L	40L	2.9	5.1	2.8	2.5	1.2	530	52L	.4	w199689
w199690	26L	89	.80	10	7.7	3.2	.76L	720	170L	.4	w199690
w199691	25L	40L	.20	4.1	5.0	1.3	.33L	150	76L	.2	w199691
w199692	30L	38	.20	6.0	2.4	6.1	.40L	640L	92L	.7	w199692

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	Th (ppm)	Tl-S (ppm)	Tm-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w199723	3.0L	0.27L	0.45L	0.20L	6.7	6.7	1.0	7.1	4.0	w199723
w199724	4.0	1.2	.47L	1.1	39	4.4	1.0	8.0	11	w199724
w199725	6.0	15	1.1L	1.3	39	6.4	1.4	110	14	w199725
w199726	4.0	.44L	.74L	1.2	26	5.1	1.2	14	13	w199726
w199727	6.0	.36L	.61L	.70	15	4.1	1.2	11	17	w199727
w199728	3.0L	.14L	.23L	.90	5.4	1.5	.2	34	4.2	w199728
w199423	3.0L	.25L	.41L	.20L	4.6	2.4	.4	6.2	7.0	w199423
w199424	3.0L	.23L	.39L	.20L	9.4	3.1	.4	4.1	11	w199424
w199660	3.0L	.53L	.88L	1.2	21	16	.9	9.9	33	w199660
w199661	3.0L	.26L	.44L	.20L	18	6.5	.5	12	12	w199661
w199662	3.0L	.38L	.63L	.20	16	11	.5	7.4	77	w199662
w199663	3.0L	.43L	.72L	.90	37	12	1.0	36	21	w199663
w199664	6.0	.61L	1.0L	2.4	29	20	1.2	27	96	w199664
w199665	4.0	.38L	.64L	.80	29	12	.8	5.3	77	w199665
w199666	3.0L	.25L	.41L	.20	25	11	.7	25	30	w199666
w199667	3.0L	.27L	.46L	.30	15	8.1	.5	13	20	w199667
w199668	4.0	.64L	1.1L	1.8	51	18	1.3	8.7	110	w199668
w199669	3.0L	.41L	.69L	.30	23	18	1.1	26	35	w199669
w199670	3.0L	.38L	.63L	.30	28	9.8	.9	23	21	w199670
w199671	3.0L	.39L	.66L	1.0	56	24	1.8	35	71	w199671
w199672	3.0L	.17L	.29L	.20L	10	13	.7	28	13	w199672
w199673	5.0	.58L	.97L	1.4	77	33	2.0	60	140	w199673
w199674	8.0	.35L	1.2L	1.7	55	14	1.3	3.8	97	w199674
w199675	3.0L	.41L	.68L	1.2	58	20	1.6	23	37	w199675
w199676	3.0L	.34L	.57L	.70	25	23	2.0	58	20	w199676
w199677	7.0	.35L	.58L	1.4	43	11	1.3	3.2	54	w199677
w199678	3.0L	.15L	.25L	.20L	7.5	9.0	.4	7.0	9.5	w199678
w199679	9.0	.55L	.92L	1.7	53	10	1.5	12	24	w199679
w199680	3.0L	.27L	.45L	.60	23	13	.8	9.9	90	w199680
w199681	5.0	.95L	1.6L	.90	100	18	.9	57	35	w199681
w199682	3.0L	.35L	.58L	.20L	24	11	.8	16	35	w199682
w199683	3.0L	.22L	.36L	.20L	22	9.4	.6	7.2	18	w199683
w199684	10	1.3L	2.2L	2.3	83	29	2.1	83	100	w199684
w199685	5.0	.64L	1.1L	2.3	85	28	2.6	49	40	w199685
w199686	3.0L	.27L	.46L	.30	22	8.4	.6	15	26	w199686
w199687	5.0	2.6	1.0L	.90	46	20	1.1	11	110	w199687
w199689	5.0	.34L	.57L	1.5	36	10	1.3	29	23	w199689
w199690	8.0	1.1L	1.9L	1.8	61	15	1.8	15	68	w199690
w199691	5.0	.50L	.83L	.80	20	14	1.1	6.1	90	w199691
w199692	6.0	.60L	1.0L	1.0	44	28	1.7	11	170	w199692

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w199693	1.8	1.3	0.060	0.029	0.020	0.15	1.7	0.057	0.03	53	w199693
w199694	2.8	2.5	.18	.022	.010	.083	3.2	.076	.08	40	w199694
w199695	1.4	.93	.060	.019	.010	.082	1.1	.050	.05	20	w199695
w199696	.98	.72	.22	.027	.020	.055	3.3	.033	.04	96	w199696
w199697	.75	.54	.075	.007	.010	.009	8.2	.010	.15	10	w199697
w199698	1.8	1.4	.088	.028	.010	.11	6.9	.065	.16	10	w199698
w199703	1.9	1.7	.060	.018	.010	.072	.56	.052	.17	9.0	w199703
w199704	.57	.44	.098	.012	.010	.017	3.6	.020	.03	1.0L	w199704
w199705	3.5	2.9	.073	.032	.020	.13	5.9	.097	.09	31	w199705
w199706	.81	.55	.069	.013	.010	.030	2.5	.028	.03	11	w199706
w199707	2.2	1.7	.079	.038	.020	.21	.14	.083	.02	1.0	w199707
w199708	9.5	5.4	.072	.26	.050	1.0	1.9	.31	.04	18	w199708
w199709	2.0	1.2	.32	.059	.010	.093	.54	.078	.03	70	w199709
w199710	.71	.70	.13	.040	.020	.033	.10	.038	.00L	1.0	w199710
w199711	2.7	1.5	.069	.050	.020	.26	.82	.077	.03	20	w199711
w199712	3.5	2.1	.079	.12	.030	.39	3.1	.092	.05	76	w199712
w199713	1.1	.96	.094	.024	.010	.064	.42	.033	.01	2.0	w199713
w199714	.56	.48	.038	.007	.010	.020	1.2	.018	.08	39	w199714
w199715	.35	.28	.046	.008	.010	.014	1.4	.013	.08	16	w199715
w199716	.95	.60	.070	.020	.010	.081	2.7	.031	.05	81	w199716
w199729	.83	.55	.079	.019	.010	.068	2.7	.027	.13	48	w199729
w199730	.55	.53	.072	.010	.050	.012	.11	.018	.04	1.0L	w199730
w199731	1.1	.75	.21	.030	.010	.090	.52	.032	.02	4.0	w199731
w199732	2.6	2.2	.062	.031	.010	.17	.71	.16	.04	17	w199732
w199733	5.4	4.6	.034	.13	.039	.80	.89	.14	.14	14	w199733
w199734	8.4	4.2	.041	.17	.041	.76	.98	.33	.06	7.0	w199734
w199735	1.2	.96	.041	.025	.010	.10	.084	.044	.06	1.0L	w199735
w199736	1.1	.80	.076	.021	.020	.073	1.3	.035	.10	13	w199736
w199737	8.1	3.9	.26	.22	.051	.70	.77	.21	.12	7.0	w199737
w199738	.73	.59	.087	.013	.030	.010	.095	.037	.02	1.0	w199738
w199739	2.1	1.9	.095	.023	.020	.080	1.5	.054	.29	9.0	w199739
w199740	1.4	1.2	.092	.020	.010	.054	5.2	.039	.07	10	w199740
w201274	3.3	2.5	.11	.056	.020	.24	.67	.063	.06	5.0	w201274
w201275	1.1	.74	.10	.014	.010	.030	5.4	.014	.11	26	w201275
w201276	1.3	1.1	.10	.016	.010	.046	1.7	.050	.04	13	w201276
w201277	3.3	2.9	.049	.061	.020	.42	1.4	.15	.11	16	w201277
w201278	1.3	.91	.085	.014	.010	.042	3.7	.047	.03	71	w201278
w201279	5.5	4.9	.058	.091	.050	.74	.42	.17	.19	3.0	w201279
w201280	2.8	2.5	.056	.013	.010	.055	.089	.097	.02	1.0	w201280
w201281	3.1	2.7	.056	.013	.010	.033	.12	.22	.17	2.0	w201281

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Cl (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Sample number
w199693	4.6	28	1.8	0.04	12	570	5.8	13	0.8	5.7	w199693
w199694	50	66	2.7	.32	11	1,500	4.7	12	.5	27	w199694
w199695	3.7	28	1.3	.04	18	1,400	1.5	14	.3	9.1	w199695
w199696	4.1	33	1.9	.03	12	1,200	4.2	8.3	.3	7.1	w199696
w199697	41	10	1.6	.04	6.0	1,100	6.5	4.3	.7L	3.9	w199697
w199698	49	120	1.9	.19	18	1,100	12	30	.7	31	w199698
w199703	3.6	13	2.3	.10	13	1,500	8.0	21	.3	17	w199703
w199704	5.3	7	1.7	.04	9.0	1,700	7.1	6.0	.2L	9.9	w199704
w199705	2.5	39	1.8	.50	71	800	30	48	.8	22	w199705
w199706	55	5	1.2	.07	10	2,000	16	6.1	.2	7.6	w199706
w199707	6.5	27	1.8	.06	16	1,400	6.0	19	1.5	13	w199707
w199708	23	240	2.6	.04L	40	230	4.1	48	5.5	23	w199708
w199709	3.3	33	1.0	.01	16	750	2.0	13	.4	8.0	w199709
w199710	3.7	15	.4	.01	12	410	3.2	8.4	.2	8.0	w199710
w199711	9.6	42	1.2	.03	15	1,600	3.7	15	1.3	7.4	w199711
w199712	39	45	2.1	.11	32	970	6.4	20	1.1	16	w199712
w199713	3.7	71	3.1	.17	8.0	1,900	6.3	11	.4	8.8	w199713
w199714	62	8	1.6	.03	5.0	2,400	3.7	6.2	.6L	11	w199714
w199715	57	6	1.6	.05	6.0	2,100	6.3	2.3	.2	7.2	w199715
w199716	4.3	12	1.3	.08	4.0	1,600	6.8	9.1	.4	7.3	w199716
w199729	1.0	21	1.8	.06	6.0	1,000	4.1	8.6	.3	13	w199729
w199730	5.0	5	.6	.03	6.0	1,200	2.0	7.7	2.0L	6.7	w199730
w199731	110	29	1.5	.14	8.0	960	2.2	14	.3	4.3	w199731
w199732	5.3	18	2.4	.10	33	1,100	8.8	27	.5	17	w199732
w199733	23	96	2.9	.23	36	480	9.1	48	4.8	140	w199733
w199734	21	130	3.0	.10	44	270	8.6	48	5.2	22	w199734
w199735	4.8	24	1.8	.02	9.0	710	5.4	13	.7	6.2	w199735
w199736	1.4	21	2.5	.14	7.0	1,200	5.1	21	.8	13	w199736
w199737	18	250	2.4	.25	42	330	14	34	2.6	30	w199737
w199738	8.2	7	3.0	.01	7.0	1,100	11	8.4	1.0L	8.8	w199738
w199739	100	38	1.4	.16	42	1,200	13	32	.5	32	w199739
w199740	67	24	2.7	.15	16	1,100	14	14	.2	20	w199740
w201274	97G	61	6.0	.85	40	850	10	26	1.1	26	w201274
w201275	86G	18	4.1	.22	31	1,100	54	9.8	.2	17	w201275
w201276	N	44	2.1	.12	14	1,500	7.3	11	.2	11	w201276
w201277	21	89	3.1	.21	22	1,000	9.9	32	1.7	37	w201277
w201278	16	19	3.2	.07	17	1,400	3.1	12	.2	8.4	w201278
w201279	19	140	3.3	.41	52	150	17	48	5.2	100	w201279
w201280	4.2	51	3.9	.05	25	240	8.5	23	.4	12	w201280
w201281	8.1	38	2.0	.10	47	540	6.1	33	.3L	29	w201281

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	Ho-S (ppm)	Sample number
w199693	2.1L	1.0L	0.29	26	4.1	1.5	1.2	0.6	0.85	0.67L	w199693
w199694	3.7L	1.7L	.20	20L	17	3.5	5.0	.5	.23	1.2L	w199694
w199695	1.5L	.7L	.22	20L	4.9	1.2	5.6	.6	.44	1.1L	w199695
w199696	2.0	.9L	.25	20L	3.6	2.5	.36	.4	.26	.64L	w199696
w199697	3.2L	1.5L	.15	20L	5.8	2.2L	.29L	.5L	.53	1.0L	w199697
w199698	3.8L	1.7L	.40	20L	8.9	5.2	3.5	.7	.26	1.2L	w199698
w199703	1.9L	.9L	.40	32	8.0	1.3L	11	.6	.18	.61L	w199703
w199704	1.7L	.8L	.25	20L	5.5	1.4	3.0	.2	.19	.53L	w199704
w199705	5.0L	2.3L	1.5	20	14	3.4L	1.8	1.1	.95	1.6L	w199705
w199706	1.5L	.7L	.20	20L	2.8	1.0L	.14	.3	.41	.48L	w199706
w199707	2.0L	.9L	.44	20L	6.2	1.4L	2.9	.7	.050	.64L	w199707
w199708	8.3L	3.8L	.61	96	15	5.6L	1.9	2.5	.25	2.6L	w199708
w199709	2.0L	.9L	.29	29	4.6	1.4L	5.8	.7	1.8	.65L	w199709
w199710	.9L	.4L	.16	21	1.5	.60L	.20	.3	.60	.28L	w199710
w199711	2.4L	1.1L	.23	40	3.9	1.6L	.21L	.7	.21	.75L	w199711
w199712	3.9L	1.8L	.54	48	8.7	2.7L	12	.9	.48	1.2L	w199712
w199713	1.3	1.0	.28	23	4.2	.83L	4.5	.3	.040	.39L	w199713
w199714	.9L	.4	.20	20L	7.4	.82	18	.2	.18	.29L	w199714
w199715	.8L	.4L	.19	23	5.7	.72	9.5	.1	.28	.27L	w199715
w199716	1.7L	.8L	.17	20L	6.9	1.1L	17	.3	.45	.53L	w199716
w199729	1.6L	.7L	.20	29	8.9	1.1L	8.1	.2	.13	.52L	w199729
w199730	.6L	.3L	.17	32	2.5	.42	.11	.2	.010L	.20L	w199730
w199731	1.3L	.6L	.48	29	6.8	1.5	.51	.3	.060	.40L	w199731
w199732	2.6L	1.2L	.48	40	5.2	1.8L	.35	1.4	.13	.83L	w199732
w199733	5.3L	2.4L	.59	45	22	3.6L	2.9	1.6	.11	1.7L	w199733
w199734	6.7L	3.0L	.70	38	14	4.6L	.61	2.7	.050	2.1L	w199734
w199735	1.1L	.5L	.22	25	4.8	.78L	4.6	.4	.29	.36L	w199735
w199736	1.6	.6L	.34	20L	8.8	1.2	4.6	.6	.15	.44L	w199736
w199737	6.6L	3.0L	.76	340	9.2	4.5L	1.2	1.7	.020	2.1L	w199737
w199738	.7L	.4	.20	33	4.8	.51L	9.5	.3	.010L	.24L	w199738
w199739	2.4L	1.1L	.53	120	7.8	1.7L	1.1	.6	.050	.78L	w199739
w199740	2.9L	1.3L	.46	48	5.4	2.8	.40	.4	.080	.94L	w199740
w201274	4.8	2.6	1.1	120	14	4.7	4.8	.8	.10	1.3	w201274
w201275	3.6	1.8	.57	22	4.4	4.1	.89	.2	.38	.89L	w201275
w201276	1.8L	.8L	.31	32	4.1	1.2L	1.0	.4	.92	.58L	w201276
w201277	3.6L	1.6L	.34	56	16	2.4L	11	1.3	.26	1.1L	w201277
w201278	2.4L	1.1L	.25	64	5.6	2.7	5.7	.4	.86	.76L	w201278
w201279	5.3L	3.1	1.0	150	22	4.3	4.5	1.5	.28	1.7L	w201279
w201280	2.6L	2.2	.60	32	9.5	2.7	.81	.9	.050	1.7L	w201280
w201281	2.7L	2.0	.61	64	11	1.9L	1.1	1.8	.040	.87L	w201281

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	P (ppm)	Pb (ppm)	Sample number
w199693	7	11	0.1	4.6	2.3	1.5	8.6	19	6	3.0	w199693
w199694	5	43	.1	12	3.5	2.3	17	32	140	12	w199694
w199695	11	9.1	.1	8.4	5.7	2.0	7.0	16	2	4.5	w199695
w199696	6	5.8	.1	31	11	2.4	5.2	9.0	12	2.9	w199696
w199697	2	6.0	.1	8.8	3.4	2.0	6.7L	11	8	6.4	w199697
w199698	7	31	.2	38	11	5.0	14	23	9	26	w199698
w199703	5	33	.2	3.3	12	1.0	4.0L	37	4	11	w199703
w199704	2	4.8	.1L	40	.53L	.68	3.7	19	1	14	w199704
w199705	37	62	.4	20	2.1	1.4	13	32	78	14	w199705
w199706	4	7.6	.1	6.9	2.0	.83	3.2L	26	2	28	w199706
w199707	6	28	.2	16	1.1	1.3	4.2L	15	4	8.4	w199707
w199708	22	270	.3	24	.75L	4.5	17L	15	92	21	w199708
w199709	8	11	.1	20	5.4	1.5	4.3L	3.4	4	28	w199709
w199710	7	5.2	.1	16	.32	.52	2.0	4.4	3	4.8	w199710
w199711	8	11	.1	10	1.5	1.5	4.9L	7.1	15	7.2	w199711
w199712	18	28	.2	17	1.1	1.2	8.2L	14	69	52	w199712
w199713	3	13	.1	30	1.1	.88	4.8	12	2	5.2	w199713
w199714	2	3.1	.1	4.5	2.3	.57	2.7	30	1	13	w199714
w199715	3	1.8	.1	1.4	1.7	.34	2.4	32	2	20	w199715
w199716	2	3.6	.1	14	5.0	.53	3.5L	9.0	2	14	w199716
w199729	2	4.2	.1	5.8	6.3	.67	3.5	22	5	16	w199729
w199730	3	5.6	.1	1.5	1.8	.28	1.3L	2.7	1	2.5	w199730
w199731	3	6.3	.2	7.4	2.2	.80	2.6L	3.3	4	3.1	w199731
w199732	18	34	.2	13	1.7	2.0	6.0	9.0	7	12	w199732
w199733	21	130	.3	27	3.1	1.9	11L	24	13	41	w199733
w199734	26	88	.4	40	1.2	7.0	21	17	40	22	w199734
w199735	5	7.8	.1	3.3	3.0	.42	3.7	16	2	3.4	w199735
w199736	3	5.1	.2	4.7	2.2	1.1	3.8	9.5	2	10	w199736
w199737	22	39	.3	45	.60L	3.0	14L	24	430	18	w199737
w199738	4	5.4	.1	1.8	.65	.58	1.6L	30		4.1	w199738
w199739	21	43	.2	3.9	4.1	.56	11	14	59	7.8	w199739
w199740	7	24	.2	13	4.7	.94	6.3	15	5	4.2	w199740
w201274	21	370	.4	61	4.5	1.3	21	23	11	12	w201274
w201275	19	9.4	.2	18	2.8	1.0	17	32	1	1.3L	w201275
w201276	7	13	.1	6.6	1.7	2.1	9.1	27	42	13	w201276
w201277	11	62	.2	7.3	1.9	2.3	8.7	37	7	29	w201277
w201278	9	15	.1	50	10	2.3	8.7	7.8	18	25	w201278
w201279	25	81	.5	14	3.6	3.3	33	48	5	36	w201279
w201280	12	31	.4	8.4	.70	3.7	13	31	4	13	w201280
w201281	29	36	.2	6.0	3.0	12	21	20	6	24	w201281

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	Pr-S (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Ta-S (ppm)	Tb (ppm)	Sample number
w199693	14L	40L	0.60	2.9	1.2	1.3	0.19L	44	44L	0.2	w199693
w199694	25L	30L	1.0	2.2	4.6	.90	.33L	580	76L	.1	w199694
w199695	11L	40L	.30	2.3	6.3	1.1	.14L	57	32L	.2	w199695
w199696	6.2L	40L	.90	1.5	2.6	1.1	N	100	42L	.5L	w199696
w199697	9.9L	40L	.20	.70	3.6	.70	N	58	67L	.5L	w199697
w199698	12L	40L	.30	7.2	6.7	1.9	N	64	80L	.7L	w199698
w199703	5.9L	30L	3.6	3.7	3.2	1.9	.44	35	40L	.3	w199703
w199704	5.2L	30L	.20	1.2	1.9	B	N	32	35L	.2	w199704
w199705	16L	50L	1.6	13	6.2	6.9	.46L	98	100L	1	w199705
w199706	4.7L	30L	.20	1.3	1.9	.90	.28	12	32L	.4L	w199706
w199707	6.3L	15	1.3	3.4	1.6	2.0	.46	32	42L	.3	w199707
w199708	26L	74	1.3	10	5.7	3.0	.75	160	170L	.5	w199708
w199709	6.3L	30L	5.0	2.7	5.3	1.4	.37	32	43L	.1	w199709
w199710	2.7L	30L	.10	1.8	2.7	.80	.16	34	18L	.1	w199710
w199711	7.3L	30L	.40	3.0	1.1	1.2	.21L	86	49L	.2	w199711
w199712	12L	40L	2.3	7.0	3.2	2.7	.36L	130	82L	.6	w199712
w199713	3.7L	30L	1.0	4.0	1.3	1.1	.17	46	25L	.3	w199713
w199714	2.8L	30L	4.1	4.7	1.3	.90	.08L	21	19L	.2	w199714
w199715	2.6L	20L	2.0	1.6	.8	.80	.08L	27	17L	.2	w199715
w199716	5.1L	30L	6.2	2.6	2.0	.80	.15	17	35L	.5L	w199716
w199729	5.0L	40L	3.4	2.9	3.3	.80	.44	19	34L	.3L	w199729
w199730	1.9L	50L	.30	1.4	1.2	.70	.28	20	13L	.1	w199730
w199731	3.9L	30L	.20	3.1	2.3	1.9	.63	39	26L	.4	w199731
w199732	8.0L	40L	1.0	5.0	4.2	2.4	.94	25	54L	.3	w199732
w199733	16L	64	4.5	12	14	3.0	.48L	51	110L	.4	w199733
w199734	21L	72	1.0	11	2.8	3.5	1.8	120	140L	.4	w199734
w199735	3.5L	40L	.30	3.0	4.6	1.0	.31	36	24L	.2	w199735
w199736	4.3L	40L	2.5	6.2	3.2	1.5	.13L	52	29L	.3	w199736
w199737	20L	46	.40	6.9	13	3.7	1.2	450	140L	.6	w199737
w199738	2.3L	40L	2.7	4.0	1.7	.90	.27	44	16L	.2	w199738
w199739	7.5L	50L	1.0	6.4	10	2.7	.22L	360	51L	.4	w199739
w199740	9.1L	40L	.20	3.3	10	2.1	.27L	46	62L	.3	w199740
w201274	9.7L	18	.50	9.9	8.8	4.4	.28L	140	65L	1	w201274
w201275	8.6L	30L	.30	2.0	12	2.1	N	42	58L	.5	w201275
w201276	12L	30L	.30	2.3	3.1	1.3	.17L	360	38L	.2	w201276
w201277	11L	39	3.8	8.0	7.0	1.7	.32L	57	75L	.2	w201277
w201278	16L	30L	.90	2.7	5.3	1.1	N	150	50L	.2	w201278
w201279	16L	55	2.4	13	6.1	5.0	1.7	84	110L	.8	w201279
w201280	7.9L	20L	.80	4.4	4.1	2.6	.58	63	53L	.6	w201280
w201281	8.4L	30L	.70	6.9	8.6	3.1	1.4	110	57L	.4	w201281

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	Th (ppm)	Tl-S (ppm)	Tm-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w199693	3.0L	3.3	0.48L	0.20L	14	8.2	0.7	7.8	21	w199693
w199694	3.0L	.50L	.83L	.20L	51	11	.5	32	25	w199694
w199695	3.0L	.21L	.35L	.20	15	7.0	.5	11	28	w199695
w199696	3.0L	.27L	.46L	.20L	12	9.0	.4	11	25	w199696
w199697	3.0L	.44L	.73L	.20L	8.3	6.0	.2	6.7	7.3	w199697
w199698	3.0L	.52L	.87L	1.4	31	13	.9	89	50	w199698
w199703	3.0L	.26L	.44L	1.9	18	3.8	1.1	27	8.6	w199703
w199704	3.0L	.23L	.38L	.20L	4.0	4.9	1.5L	11	6.6	w199704
w199705	3.0L	.68L	1.1L	2.6	30	9.1	2.5	87	15	w199705
w199706	3.0L	.21L	.35L	.20L	7.6	2.2	.4	34	3.9	w199706
w199707	3.0L	.28L	.46L	.30	15	4.8	1.2	10	13	w199707
w199708	8.0	1.1L	1.9L	2.2	45	9.4	1.9	18	28	w199708
w199709	3.0L	.28L	.47L	1.3	13	3.5	.6	8.9	15	w199709
w199710	3.0L	.12L	.20L	.20L	4.8	1.1	.4	21	4.4	w199710
w199711	3.0L	.32L	.54L	.20L	13	3.2	.6	15	11	w199711
w199712	4.0	.53L	.89L	.40	17	4.1	1.2	34	14	w199712
w199713	3.0L	.17L	.28L	.20L	8.3	7.2	.9	16	8.8	w199713
w199714	3.0L	1.9	.21L	.20L	5.3	4.1	.6	13	4.5	w199714
w199715	3.0L	.11L	.19L	.20L	1.8	3.2	.5	24	2.1	w199715
w199716	3.0L	.23L	.38L	.20L	6.8	2.0	.6	29	3.8	w199716
w199729	3.0L	.22L	.37L	2.2	16	3.6	.5	30	4.8	w199729
w199730	3.0L	.08L	.14L	.20L	6.7	2.0	.4	8.1	2.5	w199730
w199731	3.0L	.17L	.29L	.70	13	6.8	.9	8.6	6.8	w199731
w199732	5.0	.35L	.59L	1.1	15	3.4	1.0	12	13	w199732
w199733	10	1.2	1.2L	4.0	82	9.2	1.5	23	24	w199733
w199734	11	.91L	1.5L	2.1	58	15	2.1	55	49	w199734
w199735	3.0L	.16L	.26L	.30	14	4.7	.6	7.3	8.3	w199735
w199736	3.0L	.19L	.32L	.90	18	7.6	1.2	32	8.2	w199736
w199737	6.0	.89L	1.5L	1.2	26	9.5	1.4	110	29	w199737
w199738	3.0L	.10L	.17L	.20L	9.2	4.1	.7	5.4	5.1	w199738
w199739	3.0L	.33L	.56L	.90	27	7.0	1.1	32	12	w199739
w199740	3.0L	.40L	.67L	.60	15	8.4	1.0	8.7	9.8	w199740
w201274	5.0	.71	.71L	1.7	41	28	2.4	95	30	w201274
w201275	3.0L	.38L	.64L	.40	9.5	20	1.3	27	9.9	w201275
w201276	3.0L	.25L	.42L	.50	12	8.3	.5	12	38	w201276
w201277	5.0	2.6	.81L	1.9	62	12	1.3	23	32	w201277
w201278	3.0L	.32L	.54L	1.5	17	9.9	.7	6.9	25	w201278
w201279	11	.72L	1.2L	6.3	120	29	2.9	43	57	w201279
w201280	3.0L	.35L	.58L	1.1	36	27	2.4	12	43	w201280
w201281	4.0	.37L	.62L	2.1	46	17	1.3	11	110	w201281

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w201282	2.3	1.5	0.075	0.014	0.010	0.017	0.12	0.15	0.22	3.0	w201282
w201283	4.0	4.1	.076	.022	.010	.098	.82	.37	.07	2.0	w201283
w201284	3.7	1.8	.091	.012	.010	.009	3.1	.31	.10	12	w201284
w201285	1.2	1.1	.15	.020	.010	.030	2.2	.051	.04	37	w201285
w201286	1.7	1.6	.075	.016	.010	.041	.15	.076	.03	1.0	w201286
w201287	1.1	1.1	.063	.014	.010	.030	.28	.034	.05	2.0	w201287
w200449	3.5	2.0	.090	.031	.021	.14	3.1	.22	.05	8.0	w200449
w200450	2.5	1.7	.094	.029	.010	.10	2.6	.11	.08	4.0	w200450
w200451	4.0	3.1	.080	.047	.020	.27	1.5	.20	.08	11	w200451
w196592	9.8	2.2	.29	.14	.11	.44	.92	.15	.03L	4.0	w196592
w196593	10	1.8	.27	.12	.10	.43	.66	.15	.06	3.0	w196593
w196594	2.5	1.4	.14	.023	.020	.12	.19	.087	.03	3.0	w196594

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Cl (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Sample number
w201282	5.9	41	4.0	0.11	32	600	8.2	22	0.3L	25	w201282
w201283	16	43	3.3	.20	51	580	5.2	56	.3	35	w201283
w201284	N	13	3.2	.34	35	580	13	34	.3L	32	w201284
w201285	N	28	1.7	.10	19	1,000	3.5	12	.3	15	w201285
w201286	4.1	46	1.3	.06	21	680	5.4	16	.2L	14	w201286
w201287	2.0	31	1.6	.12	17	740	8.6	9.7	.1	6.2	w201287
w200449	8.8	40	.9	.12	28	520	4.3	33	.8	22	w200449
w200450	6.1	27	.8	.10	21	610	5.0	22	.5	19	w200450
w200451	8.4	57	5.1	.08	31	580	6.1	41	1.4	57	w200451
w196592	64	110	3.2	.64	.4	B	7.3	29	1.2	12	w196592
w196593	57	97	4.3	.40	49	B	5.8	24	1.3	14	w196593
w196594	28	110	2.5	.03	35	B	7.2	20	.5	19	w196594

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	Ho-S (ppm)	Sample number
w201282	1.9L	1.4	0.45	45	9.7	1.3L	3.5	1.8	0.050	1.3L	w201282
w201283	4.1L	3.0	.70	56	18	2.8L	.56	2.7	.32	1.3L	w201283
w201284	3.7L	2.2	.63	22	9.4	2.6L	.68	2.3	.68	1.2L	w201284
w201285	2.2	.9L	.36	46	3.8	2.0	.18	.5	.43	.62L	w201285
w201286	1.7L	.9	.29	52	9.8	1.1	2.3	.6	.060	.53L	w201286
w201287	1.9	.5	.38	20L	7.3	1.8	3.7	.3	.21	.47	w201287
w200449	3.8L	1.7L	.42	25	9.0	1.2L	.35	1.8	.20	1.2L	w200449
w200450	3.0L	1.4L	.34	20L	6.5	.95L	.27L	.8	.14	.95L	w200450
w200451	4.2L	1.9L	.65	46	10	2.3	.95	1.7	.12	1.3L	w200451
w196592	6.4L	2.9L	.87	150	8.1	5.2	1.2	2.7	.38	2.0L	w196592
w196593	8.6	4.6	1.5	96	12	6.3	13	3.0	.20	2.0	w196593
w196594	2.1L	1.4	.67	220	2.7	2.4	.19L	.9	.050	.68L	w196594

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	P (ppm)	Pb (ppm)	Sample number
w201282	18	18	0.2	5.5	4.8	11	14	19	3	14	w201282
w201283	30	60	.3	5.6	3.9	18	24	39	16	26	w201283
w201284	20	32	.3	9.4	6.3	15	17	39	11	12	w201284
w201285	10	20	.1	8.6	3.0	2.7	11	15	19	3.4	w201285
w201286	13	20	.1	5.2	3.5	3.8	13	17	9	11	w201286
w201287	8	12	.1	2.8	5.1	1.4	9.4	23	2	5.7	w201287
w200449	17	50	.2	15	2.2	3.8	8.0L	7.3	12	52	w200449
w200450	12	54	.1	13	1.5	2.7	8.6	6.5	9	24	w200450
w200451	17	76	.3	9.7	1.7	3.6	8.7L	13	17	23	w200451
w196592	26	29	.2	110	3.5	5.5	26	26	280	9.3	w196592
w196593	21	22	.4	100	2.9	6.6	40	43	87	11	w196593
w196594	20	16	.1	17	2.4	2.3	22	9.7	720	5.1	w196594

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	Pr-S (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Ta-S (ppm)	Tb (ppm)	Sample number
w201282	6.0L	30L	1.0	5.6	5.5	2.3	0.97	120	40L	0.4	w201282
w201283	13L	30L	.70	9.2	14	3.6	1.5	100	86L	.4	w201283
w201284	12L	30L	.60	5.1	7.8	2.9	N	68	78L	.4	w201284
w201285	6.1L	30L	.50	2.5	5.4	1.6	.18L	200	41L	.2	w201285
w201286	11L	20L	.30	2.9	3.4	1.5	.90	190	35L	.2	w201286
w201287	3.5L	20L	.80	2.6	4.6	1.7	.10L	99	24L	.3	w201287
w200449	14	60L	.50	5.7	9.7	2.1	.35	85	80L	.3	w200449
w200450	9.2L	55L	.40	4.1	7.9	1.7	.27L	78	62L	.2	w200450
w200451	13L	65L	1.3	9.6	8.2	2.9	.38L	110	87L	.6	w200451
w196592	20L	47L	.50	4.9	1.4	3.8	.58L	200	130L	.7	w196592
w196593	19L	36L	1.9	6.3	2.7L	6.2	1.4	89	130L	1	w196593
w196594	6.6L	29L	1.3L	3.1	1.2	2.9	.78	470	45L	.5	w196594

Table 5h.--Major, minor, and trace element composition of 132 bituminous coal samples from Pennsylvania reported on whole-coal basis--continued

Sample number	Th (ppm)	Tl-S (ppm)	Tm-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w201282	3.0L	0.26L	0.44L	1.5	33	15	1.4	13	88	w201282
w201283	12	.56L	.93L	2.8	65	19	1.7	10	130	w201283
w201284	8.0	.51L	.85L	2.2	34	22	1.8	19	140	w201284
w201285	3.0L	.27L	.45L	.90	14	9.8	.7	9.8	38	w201285
w201286	3.0L	.23L	.38L	.90	23	11	.5	7.2	47	w201286
w201287	3.0L	.16L	.26L	.80	18	12	.7	11	22	w201287
w200449	10	.52L	.87L	2.3	19	5.2	1.1	10	24	w200449
w200450	7.0	.41L	.68L	1.2	13	5.0	.7	9.3	27	w200450
w200451	8.0	.57L	.95L	4.0	40	9.5	1.7	14	17	w200451
w196592	4.0	.87L	1.5L	1.4	35	26	1.3	150	99	w196592
w196593	3.0L	.86L	1.4L	1.7	31	37	2.8	110	130	w196593
w196594	3.0L	.29L	.49L	1.3	23	14	.9	11	27	w196594

Summary of the analytical data on 101 Ohio bituminous coal samples

Data on 30 Ohio coal samples have been reported by Swanson and others (1976). The Ohio Geological Survey reported data on 151 coal samples analyzed by the U.S. Geological Survey and the U.S. Department of Energy (Botoman, and Stith, 1978); Zubovic and others (1979) reported data on 40 Ohio coal samples. The distribution of the 101 Ohio coal samples of this report is shown on figure 4. The 101 coal samples were obtained from 13 different coal beds. The largest number of samples were obtained from the Middle Kittanning bed (23 samples) and the Lower Kittanning bed (22 samples). Statistical comparisons are reported in tables 6a, b, and c; the analytical data are shown in tables 6e, f, g, and h. Additional descriptions and locations of the samples are given in table 6d.

In the following paragraphs the geometric means of the analytical data on the Ohio coal samples are compared with those of the 644 bituminous coal samples of this report.

Comparison of the geometric means for the ultimate and proximate analyses for the 101 Ohio samples with the 644 samples of this report shows approximate equal means for moisture, hydrogen and nitrogen. Volatile matter, ash, oxygen, and sulfur are higher in Ohio, whereas, fixed carbon and carbon are lower. The average Btu content, ash-fusion temperatures, and free-swelling index are also lower in Ohio coal. The higher average volatile-matter content and lower fixed-carbon content, as well as other parameters, indicate that the coal is of lower rank than the average coal of this report.

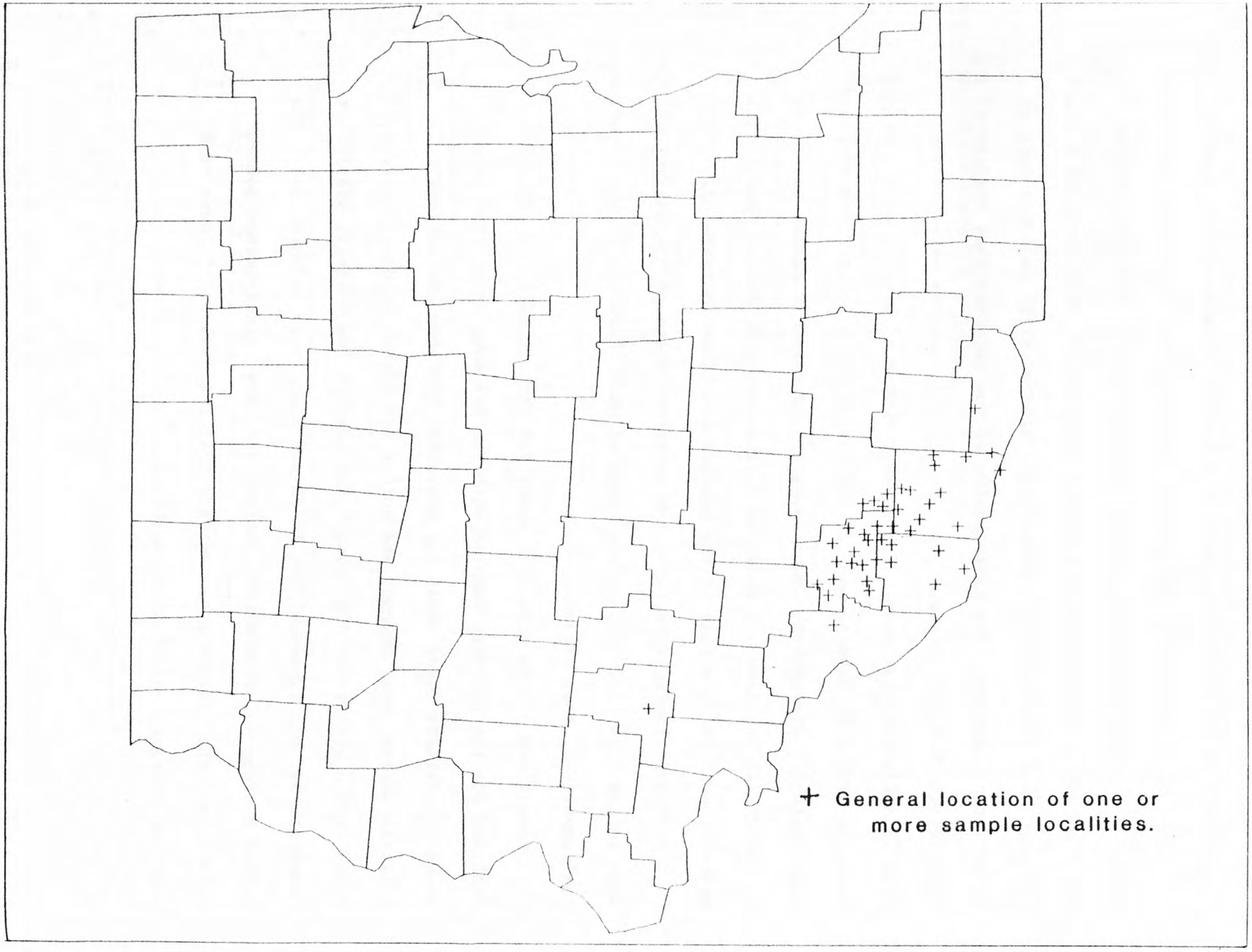

Figure 4.--Distribution of Ohio bituminous coal samples.

Table 6a.-- Arithmetic mean, observed range, geometric mean, and geometric deviation of proximate and ultimate analyses, heat of combustion, forms of sulfur, ash-fusion temperatures and free-swelling index of 99 samples from Ohio.

[All values are in percent except Btu/lb, ash-fusion temperatures, and free-swelling index and are reported on the as-received basis. °F = 9/5°C + 32; Kcal/kg = 0.556 (Btu/lb)].

	Arithmetic mean	Observed range		Geometric mean	Geometric deviation	Geometric mean 548 samples
		Minimum	Maximum			
Proximate and ultimate analyses						
Moisture	2.9	1.0	6.9	2.7	1.5	2.5
Volatile matter	37.6	26.4	44.2	37.3	1.1	28.1
Fixed carbon	42.8	22.1	52.1	42.3	1.2	54.7
Ash	16.8	5.5	47.2	14.8	1.6	9.7
Hydrogen	5.0	3.5	5.8	5.0	1.1	4.9
Carbon	64.3	40.1	76.1	63.7	1.1	71.8
Nitrogen	1.2	.6	1.5	1.2	1.2	1.3
Oxygen	8.8	2.7	16	8.6	1.3	7.1
Sulfur	3.9	.9	10	3.6	1.5	1.4
Heat of combustion						
Btu/lb	11720	7440	13710	11620	1.1	12730
Forms of sulfur						
Sulfate	.10	.01	.54	.05	3.5	.04
Pyritic	2.5	.21	9.0	2.1	1.7	.62
Organic	1.3	.06	3.0	1.2	1.8	.76
Ash-fusion temperature °C						
Initial deformation	1180	1040	1540	1170	1.1	1260
Softening temperature	1230	1050	1540	1210	1.1	1300
Fluid temperature	1300	1100	1600	1290	1.1	1360
Free-swelling Index	4.6	1.0	7.5	4.1	1.7	5.6

Table 6b.--Arithmetic mean, observed range, geometric mean and geometric deviation of ash content and contents of eleven major and minor oxides in the laboratory ash of 101 coal samples from Ohio.

[All samples were ashed at 525°C; all data except geometric deviation are in percent.]

Oxide	Arithmetic mean	Observed range		Geometric mean	Geometric deviation	Geometric mean 644 samples
		Minimum	Maximum			
(Ash)	16.5	5.3	45.9	14.6	1.6	9.76
SiO_2	42	14	70	40	1.3	43
Al_2O_3	21	7.7	34	20	1.3	24
CaO	2.1	.21	8.2	1.6	2.2	1.4
MgO	.68	.11	3.0	.58	1.7	.68
Na_2O	.39	.12	1.1	.35	1.5	.34
K_2O	1.7	.20	4.5	1.5	1.8	1.6
Fe_2O_3	26	5.3	63	23	1.7	11
MnO	.03	.01	.18	.03	1.9	.02
TiO_2	1.0	.2	2.2	.95	1.4	1.1
P_2O_5	.39	.01	7.9	.13	3.7	.13
SO_3	2.4	.08	12	1.8	2.2	1.7

The geometric means for most of the major and minor element oxides in ash, (table 6b), are quite similar for the Ohio coal ash and the ash of the 644 bituminous coal samples of this report. The Fe_2O_3 content of the Ohio coal ash is more than two-fold higher because of the higher content of pyrite in the Ohio coal samples, (table 6a). As a result of the higher Fe_2O_3 content, the major oxides SiO_2 and Al_2O_3 are slightly lower in average Ohio coal ash.

The geometric means for trace elements, (table 6c), in coal show that only Co, Cu, Pb and Sb are lower in Ohio coal. Arsenic, B, Cd, Cr, Cs, F, Ge, Hg, Li, Mn, Mo, Nb, Nd, Se, Zn and Zr are higher in Ohio coal than in the 644 samples of bituminous coal of this report. It is of interest that, although the total average sulfur content as well as pyritic sulfur content are higher in Ohio coal, such chalcophyllic elements as Co, Cu, and Pb are lower in Ohio coal. This suggests that these elements are (1) not associated with pyrite and (2) were not emplaced in the coal progenitors at the time that pyrite was accumulating. Finkelman (1980) has reported that Pb is frequently present in Appalachian coals as PbSe.

Table 6c.--Arithmetic mean, observed range, geometric mean, and geometric deviation of 38 elements in 101 coal samples from Ohio.

[All data are in parts per million and reported on a whole-coal basis; L means less than value shown.]

Element	Arithmetic mean	Observed range Minimum	Observed range Maximum	Geometric mean	Geometric deviation	Geometric mean 644 samples
Ag	0.05	0.01	0.32	0.03	2.3	0.03
As	20	2.0	130	13	2.6	8.4
B	54	25	120	50	1.4	14
Ba	75	6.4	500	48	2.5	48
Be	2.2	.68	6.0	2.0	1.6	1.9
Cd	.14	.02	.87	.10	2.1	.07
Ce	19	4.0	81.	16	1.7	16
Co	6.0	.8	34	4.8	1.8	6.2
Cr	20	5.2	67	18	1.7	14
Cs	1.4	.1L	6.4	.88	2.6	.66
Cu	15	4.2	110	12	1.7	15
Eu	.39	.09	1.4	.34	1.6	.33
F	120	20L	1300	75	2.5	51
Ga	6.0	2.1	20	5.3	.16	4.8
Ge	4.3	.35L	12	3.2	2.4	1.1
Hf	.86	.1L	2.6	.70	2.0	.61
Hg	.23	.03	1.1	.18	2.0	.12
La	10	2.0	46	8.6	1.8	8.8
Li	31	5.8	150	22	2.3	15
Lu	.18	.1	.5	.16	1.6	.15
Mn	36	3.9	180	28	2.0	14
Mo	3.1	.56L	10	2.4	2.0	1.5
Nb	2.2	.47L	8.1	1.8	1.8	1.4
Nd	11	2.8	43	5.6	2.6	4.2
Ni	13	2.8	53	11	1.8	12
Pb	9.3	.99L	46	6.3	2.4	7.0
Sb	.79	.2	4.8	.56	2.2	.73
Sc	4.2	1.2	15	3.7	1.6	3.3
Se	4.7	.8L	20	3.5	2.2	2.8
Sm	1.9	.4	7.5	1.6	1.7	1.6
Sr	81	25	530	66	1.8	65
Tb	.3	.1L	.8	.26	1.6	.26
U	1.8	.1L	9.1	1.2	2.5	1.3
V	21	5.7	110	18	1.8	16
Y	8.4	2.2L	25	7.3	1.7	6.2
Yb	1.1	.3	2.9	.98	1.5	.84
Zn	32	7.0	210	24	2.0	14
Zr	22	4.0	86	18	1.9	13

Table 6d.--Descriptions for 101 bituminous coal samples from Ohio.

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w198978	Ohio	Harrison	401003n	810234w	Monongahela	Pittsburgh No 8	Channel	51.0
w198979	Ohio	Jefferson	401959n	805036w	Monongahela	Pittsburgh No 8	Channel	52.0
w198980	Ohio	Belmont	400241n	811134w	Monongahela	Meigs Creek No 9	Channel	34.0
w198981	Ohio	Belmont	400639n	804328w	Washington	No Data Entered	Channel	72.0
w198982	Ohio	Belmont	400639n	804328w	Washington	No Data Entered	Channel	59.0
w198983	Ohio	Vinton	391447n	822304w	Allegheny	Clarion No 4a	Channel	55.0
w198984	Ohio	Belmont	400224n	810904w	Monongahela	Meigs Creek No 9	Channel	44.0
w198985	Ohio	Guernsey	400003n	811921w	Monongahela	Pittsburgh No 8	Channel	52.0
w198986	Ohio	Jefferson	401033n	804550w	Monongahela	Waynesburg No 11a	Channel	37.0
w198987	Ohio	Harrison	400935n	805309w	Monongahela	Meigs Creek No 9	Channel	40.0
w198988	Ohio	Belmont	400152n	810031w	Monongahela	Waynesburg No 11a	Channel	38.0
w198989	Ohio	Belmont	400741n	810212w	Monongahela	Meigs Creek No 9	Channel	43.0
w198990	Ohio	Guernsey	400135n	811541w	Monongahela	Pittsburgh No 8	Channel	38.0
w198991	Ohio	Hocking	392509n	822917w	Allegheny	Clarion No 4a	Channel	20.0
w198992	Ohio	Vinton	392045n	822534w	Allegheny	Clarion No 4a	Channel	30.0
w198993	Ohio	Vinton	391710n	822615w	Allegheny	Clarion No 4a	Channel	34.0
w198995	Ohio	Vinton	391447n	822304w	Allegheny	Clarion No 4a	Channel	14.0
w198996	Ohio	Vinton	391447n	822304w	Allegheny	Clarion No 4a	Channel	14.0
w198997	Ohio	Belmont	400741n	810212w	Monongahela	Meigs Creek No 9	Channel	12.0
w198998	Ohio	Vinton	391710n	822615w	Allegheny	Clarion No 4a	Channel	11.0
w199933	Ohio	Noble	394904n	812502w	Allegheny	M Kittanning No 6	Drill Core	36.0
w199934	Ohio	Monroe	394721n	811838w	Allegheny	Upper Freeport No 7	Drill Core	44.0
w199935	Ohio	Monroe	394721n	811838w	Allegheny	M Kittanning No 6	Drill Core	43.0
w199936	Ohio	Monroe	394721n	811838w	Allegheny	Brookville No 4	Drill Core	44.0
w199937	Ohio	Monroe	395136n	811715w	Allegheny	Upper Freeport No 7	Drill Core	41.0
w199939	Ohio	Monroe	395136n	811715w	Allegheny	M Kittanning No 6	Drill Core	36.0
w199940	Ohio	Noble	394632n	812540w	Allegheny	M Kittanning No 6	Drill Core	47.0
w199941	Ohio	Monroe	394643n	811436w	Allegheny	Upper Freeport No 7	Drill Core	46.0
w199942	Ohio	Monroe	395036n	811429w	Allegheny	Upper Freeport No 7	Drill Core	52.0
w199943	Ohio	Monroe	395036n	811429w	Allegheny	M Kittanning No 6	Drill Core	42.0
w199944	Ohio	Noble	395133n	812103w	Allegheny	M Kittanning No 6	Drill Core	40.0
w199945	Ohio	Noble	395133n	812103w	Allegheny	Brookville No 4	Drill Core	29.0
w199946	Ohio	Noble	395133n	812103w	No Data Entered	No Data Entered	Drill Core	31.0
w199947	Ohio	Noble	395406n	812640w	Allegheny	Upper Freeport No 7	Drill Core	39.0
w199948	Ohio	Noble	395406n	812640w	Allegheny	L Kittanning No 5	Drill Core	30.0

Table 6d.- Descriptions of 101 bituminous coal samples from Ohio--continued

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w199914	Ohio	Noble	394034n	812046w	Allegheny	L Kittanning No 5	Drill Core	44.0
w199915	Ohio	Noble	393932n	813222w	Allegheny	M Kittanning No 6	Drill Core	38.0
w199916	Ohio	Noble	394613n	812242w	Allegheny	Upper Freeport No 7	Drill Core	33.0
w199917	Ohio	Noble	394613n	812242w	Allegheny	L Kittanning No 5	Drill Core	27.0
w199918	Ohio	Noble	394613n	812242w	Allegheny	Brookville No 4	Drill Core	38.0
w199919	Ohio	Noble	394613n	812242w	Allegheny	M Kittanning No 6	Drill Core	44.0
w199920	Ohio	Noble	394034n	812046w	Allegheny	Lower Freeport No 6a	Drill Core	62.0
w199921	Ohio	Noble	394233n	812125w	Allegheny	Upper Freeport No 7	Drill Core	45.0
w199922	Ohio	Noble	394233n	812125w	Allegheny	M Kittanning No 6	Drill Core	33.0
w199923	Ohio	Noble	394034n	812046w	Allegheny	M Kittanning No 6	Drill Core	29.0
w199924	Ohio	Noble	394233n	812125w	Pottsville	Bedford	Drill Core	56.0
w199926	Ohio	Noble	394632n	812540w	Allegheny	L Kittanning No 5	Drill Core	33.0
w199927	Ohio	Noble	394632n	812540w	No Data Entered	No Data Entered	Drill Core	27.0
w199928	Ohio	Monroe	394643n	811436w	Allegheny	M Kittanning No 6	Drill Core	34.0
w199929	Ohio	Monroe	394643n	811436w	Allegheny	L Kittanning No 5	Drill Core	34.0
w199930	Ohio	Monroe	395136n	811715w	Allegheny	L Kittanning No 5	Drill Core	31.0
w199931	Ohio	Monroe	395136n	811715w	Allegheny	L Kittanning No 5	Drill Core	12.0
w199741	Ohio	Washington	393303n	813051w	Allegheny	L Kittanning No 5	Drill Core	30.0
w199742	Ohio	Noble	394154n	813527w	Allegheny	M Kittanning No 6	Drill Core	28.0
w199743	Ohio	Noble	394257n	813046w	Allegheny	Lower Freeport No 6a	Drill Core	39.0
w199744	Ohio	Noble	394257n	813046w	Allegheny	Lower Freeport No 6a	Drill Core	23.0
w200975	Ohio	Noble	394233n	812125w	Allegheny	L Kittanning No 5	Drill Core	39.0
w200976	Ohio	Noble	395406n	812640w	Allegheny	Lower Freeport No 6a	Drill Core	51.0
w200977	Ohio	Noble	395406n	812640w	Allegheny	M Kittanning No 6	Drill Core	40.0
w200978	Ohio	Noble	395049n	813109w	Allegheny	Upper Freeport No 7	Drill Core	32.0
w200979	Ohio	Noble	395049n	813109w	Allegheny	M Kittanning No 6	Drill Core	33.0
w200980	Ohio	Noble	394654n	812955w	Allegheny	M Kittanning No 6	Drill Core	37.0
w200981	Ohio	Noble	394654n	812955w	Allegheny	L Kittanning No 5	Drill Core	34.0
w200982	Ohio	Noble	395435n	811827w	Allegheny	Upper Freeport No 7	Drill Core	32.0
w200983	Ohio	Noble	395435n	811827w	Allegheny	Lower Freeport No 6a	Drill Core	47.0
w200984	Ohio	Noble	395435n	811827w	Allegheny	M Kittanning No 6	Drill Core	29.0
w200986	Ohio	Noble	395435n	811827w	Allegheny	L Kittanning No 5	Drill Core	25.0
w200987	Ohio	Noble	395435n	811827w	Allegheny	L Kittanning No 5	Drill Core	12.0
w200988	Ohio	Noble	395249n	812205w	Allegheny	Upper Freeport No 7	Drill Core	33.0
w200989	Ohio	Noble	395249n	812205w	Allegheny	M Kittanning No 6	Drill Core	45.0

Table 6d.--Descriptions for 101 bituminous coal samples from Ohio--continued

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w201713	Ohio	Belmont	395434n	805529w	Allegheny	Brookville No 4	Drill Core	29.0
w201714	Ohio	Monroe	394914n	810109w	Monongahela	Meigs Creek No 9	Drill Core	34.0
w201715	Ohio	Monroe	394914n	810109w	Monongahela	Redstone	Drill Core	33.0
w201716	Ohio	Monroe	394914n	810109w	Allegheny	Lower Freeport No 6a	Drill Core	29.0
w201717	Ohio	Monroe	394914n	810109w	Allegheny	M Kittanning No 6	Drill Core	31.0
w201718	Ohio	Monroe	394914n	810109w	Allegheny	L Kittanning No 5	Drill Core	32.0
w201719	Ohio	Monroe	394914n	810109w	No Data Entered	No Data Entered	Drill Core	33.0
w201720	Ohio	Monroe	394152n	810202w	Monongahela	Pittsburgh No 8	Drill Core	42.0
w201721	Ohio	Monroe	394152n	810202w	Allegheny	L Kittanning No 5	Drill Core	42.0
w201580	Ohio	Noble	395249n	812205w	No Data Entered	No Data Entered	Drill Core	30.0
w201581	Ohio	Belmont	395603n	810627w	Monongahela	Pittsburgh No 8	Drill Core	51.0
w201582	Ohio	Guernsey	395848n	811654w	Allegheny	M Kittanning No 6	Drill Core	33.0
w201583	Ohio	Guernsey	395848n	811654w	Allegheny	Upper Freeport No 7	Drill Core	41.0
w201584	Ohio	Guernsey	395848n	811654w	Allegheny	L Kittanning No 5	Drill Core	33.0
w201585	Ohio	Belmont	395603n	810627w	Allegheny	Lower Freeport No 6a	Drill Core	36.0
w201586	Ohio	Belmont	395603n	810627w	Allegheny	M Kittanning No 6	Drill Core	37.0
w201587	Ohio	Belmont	395603n	810627w	Allegheny	L Kittanning No 5	Drill Core	41.0
w201589	Ohio	Noble	395928n	812233w	Allegheny	M Kittanning No 6	Drill Core	31.0
w201590	Ohio	Noble	395928n	812233w	Allegheny	L Kittanning No 5	Drill Core	36.0
w201592	Ohio	Belmont	395335n	810907w	Allegheny	Lower Freeport No 6a	Drill Core	43.0
w201593	Ohio	Belmont	395335n	810907w	Allegheny	M Kittanning No 6	Drill Core	32.0
w201594	Ohio	Belmont	395335n	810907w	Allegheny	L Kittanning No 5	Drill Core	33.0
w201595	Ohio	Belmont	395437n	811409w	Allegheny	M Kittanning No 6	Drill Core	36.0
w201596	Ohio	Belmont	395437n	811409w	Allegheny	L Kittanning No 5	Drill Core	37.0
w201597	Ohio	Belmont	395437n	811409w	Allegheny	L Kittanning No 5	Drill Core	14.0
w201598	Ohio	Belmont	395808n	811238w	Allegheny	Upper Freeport No 7	Drill Core	38.0
w201599	Ohio	Belmont	395920n	810338w	Monongahela	Meigs Creek No 9	Drill Core	41.0
w201600	Ohio	Monroe	394519n	805337w	Monongahela	Fishpot	Drill Core	28.0
w201601	Ohio	Belmont	395920n	810338w	Monongahela	Fishpot	Drill Core	29.0
w201602	Ohio	Belmont	395808n	811238w	Allegheny	L Kittanning No 5	Drill Core	29.0
w201603	Ohio	Belmont	395808n	811238w	Allegheny	L Kittanning No 5	Drill Core	6.0

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio.

[All analyses except Kcal/kg, Btu, free-swelling index and ash-fusion temperatures in percent. For each sample number, the analyses are reported three ways: first, as-received, second, moisture free, and third, moisture and ash free. All analyses by Coal Analysis Section, Department of Energy, Pittsburgh, Pa. B, not determined. 1600G for ash-fusion temperatures means greater than 1600 C.]

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w198978	6.9	37.4	47.2	8.5	5.3	66.0	1.2	16.3	2.7	6,510	11,710
	---	40.2	50.7	9.1	4.9	70.9	1.3	10.9	2.9	6,990	12,580
	---	44.2	55.8	---	5.4	78.0	1.4	12.0	3.2	7,690	13,850
w198979	2.9	36.5	50.2	10.4	5.1	69.7	1.4	10.1	3.4	6,980	12,560
	---	37.6	51.7	10.7	4.9	71.8	1.4	7.7	3.5	7,190	12,940
	---	42.1	57.9	---	5.5	80.4	1.6	8.7	3.9	8,050	14,490
w198980	6.0	44.2	42.6	7.2	5.6	66.7	1.2	14.3	5.1	6,800	12,240
	---	47.0	45.3	7.7	5.2	71.0	1.3	9.5	5.4	7,240	13,020
	---	50.9	49.1	---	5.7	76.8	1.4	10.3	5.9	7,840	14,100
w198981	2.0	29.7	33.2	35.1	3.9	49.1	1.0	8.5	2.5	4,870	8,770
	---	30.3	33.9	35.8	3.8	50.1	1.0	6.9	2.6	4,970	8,950
	---	47.2	52.8	---	5.8	78.1	1.6	10.7	4.0	7,750	13,940
w198982	4.3	34.5	41.8	19.4	4.7	60.2	1.2	10.4	4.1	6,050	10,880
	---	36.1	43.7	20.3	4.4	62.9	1.3	6.9	4.3	6,320	11,370
	---	45.2	54.8	---	5.5	78.9	1.6	8.6	5.4	7,920	14,260
w198983	2.9	38.4	47.2	11.5	5.0	68.0	1.3	10.5	3.6	6,860	12,360
	---	39.5	48.6	11.8	4.8	70.0	1.3	8.2	3.7	7,070	12,730
	---	44.9	55.1	---	5.5	79.4	1.5	9.3	4.2	8,020	14,430
w198984	3.6	38.8	48.0	9.6	5.3	70.2	1.4	11.0	2.5	6,990	12,590
	---	40.2	49.8	10.0	5.1	72.8	1.5	8.1	2.6	7,260	13,060
	---	44.7	55.3	---	5.6	80.9	1.6	9.0	2.9	8,060	14,500
w198985	3.2	30.1	35.2	31.5	4.2	51.2	1.0	9.6	2.4	5,120	9,220
	---	31.1	36.4	32.5	4.0	52.9	1.0	7.0	2.5	5,290	9,530
	---	46.1	53.9	---	5.9	78.4	1.5	10.3	3.7	7,850	14,120
w198986	4.3	38.5	49.0	8.2	5.4	70.6	1.4	11.7	2.8	7,030	12,650
	---	40.2	51.2	8.6	5.1	73.8	1.5	8.2	2.9	7,340	13,220
	---	44.0	56.0	---	5.6	80.7	1.6	9.0	3.2	8,030	14,460
w198987	4.1	37.6	48.6	9.7	5.1	68.8	1.3	11.6	3.5	6,900	12,420
	---	39.2	50.7	10.1	4.8	71.7	1.4	8.3	3.6	7,190	12,950
	---	43.6	56.4	---	5.4	79.8	1.5	9.2	4.1	8,000	14,410
w198988	4.6	34.4	44.9	16.1	4.9	63.4	1.2	11.7	2.8	6,300	11,350
	---	36.1	47.1	16.9	4.6	66.5	1.3	8.0	2.9	6,610	11,900
	---	43.4	56.6	---	5.5	79.9	1.5	9.6	3.5	7,950	14,310

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w198978	4.1	0.02	0.57	2.11	1.0	1,180	1,240	1,290
	---	.02	.61	2.27				
	---	.02	.67	2.49				
w198979	.9	.26	1.80	1.33	6.0	1,150	1,205	1,270
	---	.27	1.85	1.37				
	---	.30	2.08	1.53				
w198980	1.6	.01	2.87	2.17	3.0	1,140	1,165	1,260
	---	.01	3.05	2.31				
	---	.01	3.31	2.50				
w198981	.2	.23	1.70	.60	.0	1,540	1,540	1,540
	---	.23	1.73	.61				
	---	.37	2.70	.95				
w198982	2.2	.06	2.58	1.45	5.0	1,180	1,235	1,290
	---	.06	2.70	1.52				
	---	.08	3.38	1.90				
w198983	1.1	.25	2.08	1.28	5.0	1,095	1,150	1,205
	---	.26	2.14	1.32				
	---	.29	2.43	1.50				
w198984	1.5	.24	1.39	.85	5.0	1,180	1,235	1,290
	---	.25	1.44	.88				
	---	.28	1.60	.98				
w198985	1.4	.23	1.62	.59	1.0	1,430	1,490	1,540
	---	.24	1.67	.61				
	---	.35	2.48	.90				
w198986	1.8	.01	1.57	1.22	4.5	1,110	1,165	1,275
	---	.01	1.64	1.27				
	---	.01	1.79	1.39				
w198987	1.5	.01	1.92	1.59	5.0	1,090	1,115	1,240
	---	.01	2.00	1.66				
	---	.01	2.23	1.84				
w198988	2.1	.01	1.57	1.23	4.0	1,200	1,245	1,365
	---	.01	1.65	1.29				
	---	.01	1.98	1.55				

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w198989	5.8	43.9	42.8	7.5	5.5	66.1	1.2	14.7	5.0	6,790	12,230
	---	46.6	45.4	8.0	5.2	70.2	1.3	10.1	5.3	7,210	12,980
	---	50.6	49.4	---	5.6	76.2	1.4	11.0	5.8	7,830	14,100
w198990	3.7	38.7	46.1	11.5	5.2	67.0	1.3	10.1	4.8	6,730	12,110
	---	40.2	47.9	11.9	5.0	69.6	1.3	7.1	5.0	6,980	12,570
	---	45.6	54.4	---	5.6	79.0	1.5	8.0	5.7	7,930	14,280
w198991	3.4	40.6	44.3	11.7	5.2	66.5	1.3	11.9	3.3	6,660	11,990
	---	42.0	45.9	12.1	5.0	68.8	1.3	9.2	3.4	6,900	12,420
	---	47.8	52.2	---	5.7	78.3	1.5	10.5	3.9	7,850	14,130
w198992	6.7	40.1	42.2	11.0	5.5	63.7	1.3	15.0	3.6	6,450	11,620
	---	43.0	45.2	11.8	5.1	68.3	1.4	9.7	3.9	6,920	12,450
	---	48.7	51.3	---	5.8	77.4	1.6	11.0	4.4	7,840	14,120
w198993	5.6	40.1	43.0	11.3	5.5	64.4	1.4	13.6	3.8	6,520	11,740
	---	42.5	45.6	12.0	5.2	68.2	1.5	9.1	4.0	6,910	12,440
	---	48.3	51.7	---	5.9	77.5	1.7	10.4	4.6	7,850	14,130
w198995	5.8	39.0	45.2	10.0	5.8	66.5	1.3	13.6	2.8	6,650	11,970
	---	41.4	48.0	10.6	5.5	70.6	1.4	9.0	3.0	7,060	12,700
	---	46.3	53.7	---	6.1	79.0	1.5	10.0	3.3	7,900	14,210
w198996	5.0	40.4	38.0	16.6	5.3	60.1	1.2	11.9	4.9	6,170	11,100
	---	42.5	40.0	17.5	5.0	63.3	1.3	7.8	5.2	6,490	11,690
	---	51.5	48.5	---	6.1	76.7	1.5	9.5	6.2	7,870	14,160
w198997	2.6	34.3	39.8	23.3	4.6	57.6	1.3	8.8	4.4	5,850	10,530
	---	35.2	40.9	23.9	4.4	59.1	1.3	6.7	4.5	6,000	10,810
	---	46.3	53.7	---	5.8	77.7	1.8	8.8	5.9	7,890	14,200
w198998	5.4	36.4	38.9	19.3	4.7	56.7	1.3	12.5	5.5	5,730	10,320
	---	38.5	41.1	20.4	4.3	59.9	1.4	8.1	5.8	6,060	10,910
	---	48.3	51.7	---	5.4	75.3	1.7	10.2	7.3	7,610	13,700
w199933	3.1	38.9	48.7	9.3	5.3	70.0	1.3	9.5	4.6	7,170	12,900
	---	40.1	50.3	9.6	5.1	72.2	1.3	7.0	4.7	7,400	13,320
	---	44.4	55.6	---	5.7	79.9	1.5	7.7	5.3	8,180	14,730
w199934	2.1	37.7	42.9	17.3	4.9	65.3	1.2	7.8	3.6	6,630	11,930
	---	38.5	43.8	17.7	4.8	66.7	1.2	6.1	3.7	6,770	12,180
	---	46.8	53.2	---	5.8	81.0	1.5	7.4	4.5	8,220	14,800
w199935	2.4	40.6	41.2	15.8	5.1	66.4	1.2	8.8	2.7	6,730	12,110
	---	41.6	42.2	16.2	5.0	68.0	1.2	6.8	2.8	6,900	12,410
	---	49.6	50.4	---	5.9	81.2	1.5	8.1	3.3	8,230	14,810

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio--continued

Sample number	Air-dried loss	Forms of sulfur: Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C: Initial deform.	soften.	fluid
w198989	2.8	0.43	2.64	1.92	4.0	1,095	1,150	1,205
	---	.46	2.80	2.04				
	---	.50	3.04	2.21				
w198990	1.7	.24	2.67	1.94	4.0	1,095	1,150	1,210
	---	.25	2.77	2.01				
	---	.28	3.15	2.29				
w198991	.0	.30	1.80	1.24	2.0	1,095	1,155	1,205
	---	.31	1.86	1.28				
	---	.35	2.12	1.46				
w198992	3.4	.43	2.02	1.11	2.0	1,100	1,150	1,205
	---	.46	2.17	1.19				
	---	.52	2.45	1.35				
w198993	2.7	.21	2.26	1.35	1.0	1,150	1,210	1,265
	---	.22	2.39	1.43				
	---	.25	2.72	1.62				
w198995	3.1	.18	1.24	1.34	2.0	1,320	1,375	1,430
	---	.19	1.32	1.42				
	---	.21	1.47	1.59				
w198996	2.4	.21	2.79	1.92	5.0	1,095	1,155	1,205
	---	.22	2.94	2.02				
	---	.27	3.56	2.45				
w198997	.1	.18	2.92	1.26	5.0	1,095	1,155	1,210
	---	.18	3.00	1.29				
	---	.24	3.94	1.70				
w198998	1.3	.45	3.99	1.04	1.0	1,070	1,130	1,180
	---	.48	4.22	1.10				
	---	.60	5.30	1.38				
w199933	1.4	.08	3.05	1.43	5.0	1,205	1,265	1,320
	---	.08	3.15	1.48				
	---	.09	3.48	1.63				
w199934	.7	.04	2.76	.81	5.0	1,150	1,205	1,270
	---	.04	2.82	.83				
	---	.05	3.42	1.00				
w199935	1.0	.03	1.55	1.13	7.0	1,405	1,455	1,515
	---	.03	1.59	1.16				
	---	.04	1.89	1.38				

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio--continued

Sample number	Proximate Analysis: Moisture	Volatile matter	Fixed carbon	Ash	Ultimate Analysis: Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Heat of Combustion: Kcal/kg	Btu/lb
w199936	1.5	36.8	36.9	24.8	4.7	56.4	1.1	6.6	6.3	5,990	10,790
	---	37.4	37.5	25.2	4.6	57.3	1.1	5.3	6.4	6,090	10,950
	---	49.9	50.1	---	6.2	76.5	1.5	7.1	8.5	8,130	14,640
w199937	3.1	36.5	49.4	11.0	5.3	71.1	1.3	9.9	1.4	7,090	12,760
	---	37.7	51.0	11.4	5.1	73.4	1.3	7.4	1.4	7,320	13,170
	---	42.5	57.5	---	5.8	82.8	1.5	8.3	1.6	8,250	14,860
w199939	2.8	42.6	45.4	9.2	5.3	70.0	1.3	8.9	5.4	7,230	13,010
	---	43.8	46.7	9.5	5.1	72.0	1.3	6.6	5.6	7,440	13,390
	---	48.4	51.6	---	5.7	79.5	1.5	7.3	6.1	8,210	14,790
w199940	2.5	42.3	46.0	9.2	5.4	71.5	1.3	8.7	3.8	7,220	12,990
	---	43.4	47.2	9.4	5.3	73.3	1.3	6.6	3.9	7,400	13,320
	---	47.9	52.1	---	5.8	81.0	1.5	7.3	4.3	8,170	14,710
w199941	3.1	34.5	45.3	17.1	4.8	64.2	1.1	8.7	4.1	6,510	11,720
	---	35.6	46.7	17.6	4.6	66.3	1.1	6.1	4.2	6,720	12,100
	---	43.2	56.8	---	5.6	80.5	1.4	7.4	5.1	8,160	14,690
w199942	2.9	32.3	44.4	20.4	4.6	62.5	1.1	9.1	2.2	6,250	11,250
	---	33.3	45.7	21.0	4.4	64.4	1.1	6.7	2.3	6,440	11,590
	---	42.1	57.9	---	5.6	81.5	1.4	8.5	2.9	8,150	14,670
w199943	2.1	37.4	40.2	20.3	4.8	61.4	1.1	8.0	4.4	6,340	11,420
	---	38.2	41.1	20.7	4.7	62.7	1.1	6.3	4.5	6,480	11,660
	---	48.2	51.8	---	5.9	79.1	1.4	7.9	5.7	8,170	14,710
w199944	3.0	38.4	43.0	15.6	5.6	66.2	1.2	9.0	2.4	6,660	11,980
	---	39.6	44.3	16.1	5.4	68.2	1.2	6.5	2.5	6,860	12,350
	---	47.2	52.8	---	6.5	81.3	1.5	7.8	2.9	8,180	14,720
w199945	1.9	41.7	41.6	14.8	5.2	68.1	1.3	7.4	3.1	6,920	12,450
	---	42.5	42.4	15.1	5.1	69.4	1.3	5.8	3.2	7,050	12,690
	---	50.1	49.9	---	6.0	81.8	1.6	6.9	3.7	8,300	14,950
w199946	2.4	35.0	43.4	19.2	5.0	62.1	1.2	8.0	4.6	6,390	11,500
	---	35.9	44.5	19.7	4.8	63.6	1.2	6.0	4.7	6,550	11,780
	---	44.6	55.4	---	6.0	79.2	1.5	7.5	5.9	8,150	14,670
w199947	5.0	28.9	39.6	26.5	4.2	55.2	.9	10.7	2.4	5,450	9,800
	---	30.4	41.7	27.9	3.8	58.1	.9	6.6	2.5	5,730	10,320
	---	42.2	57.8	---	5.3	80.6	1.3	9.1	3.5	7,950	14,310
w199948	3.4	41.7	44.4	10.5	5.4	69.9	1.2	9.9	3.1	7,050	12,690
	---	43.2	46.0	10.9	5.2	72.4	1.2	7.1	3.2	7,300	13,140
	---	48.4	51.6	---	5.8	81.2	1.4	8.0	3.6	8,190	14,740

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio--continued

Sample number	Air-dried loss	Forms of sulfur: Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C: Initial deform.	soften.	fluid
w199936	0.5	0.04	5.01	1.27	5.0	1,155	1,210	1,265
	---	.04	5.09	1.29				
	---	.05	6.80	1.72				
w199937	1.5	.01	.99	.44	5.0	1,405	1,455	1,505
	---	.01	1.02	.45				
	---	.01	1.15	.51				
w199939	1.4	.15	3.82	1.39	6.0	1,180	1,235	1,290
	---	.15	3.93	1.43				
	---	.17	4.34	1.58				
w199940	1.0	.02	2.10	1.63	5.0	1,125	1,180	1,235
	---	.02	2.15	1.67				
	---	.02	2.38	1.85				
w199941	1.5	.17	3.86	.06	5.0	1,150	1,215	1,270
	---	.18	3.98	.06				
	---	.21	4.84	.08				
w199942	1.4	.03	1.72	.48	5.0	1,380	1,430	1,485
	---	.03	1.77	.49				
	---	.04	2.24	.63				
w199943	.9	.21	2.78	1.45	5.0	1,155	1,205	1,265
	---	.21	2.84	1.48				
	---	.27	3.58	1.87				
w199944	1.6	.01	1.43	.99	5.0	1,325	1,380	1,430
	---	.01	1.47	1.02				
	---	.01	1.76	1.22				
w199945	.6	.01	1.79	1.31	5.0	1,345	1,400	1,455
	---	.01	1.82	1.34				
	---	.01	2.15	1.57				
w199946	1.0	.02	3.44	1.10	5.0	1,205	1,265	1,320
	---	.02	3.52	1.13				
	---	.03	4.39	1.40				
w199947	3.4	.02	1.75	.68	1.0	1,375	1,435	1,485
	---	.02	1.84	.72				
	---	.03	2.55	.99				
w199948	1.5	.02	1.46	1.60	5.0	1,125	1,180	1,235
	---	.02	1.51	1.66				
	---	.02	1.70	1.86				

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w199914	1.5	39.1	42.7	16.7	5.0	65.2	1.2	6.6	5.3	6,680	12,020
	---	39.7	43.4	17.0	4.9	66.2	1.2	5.3	5.4	6,780	12,210
	---	47.8	52.2	---	5.9	79.7	1.5	6.4	6.5	8,170	14,700
w199915	2.3	40.0	46.0	11.7	5.2	68.8	1.1	7.3	6.0	6,950	12,510
	---	40.9	47.1	12.0	5.1	70.4	1.1	5.4	6.1	7,110	12,800
	---	46.5	53.5	---	5.7	80.0	1.3	6.1	7.0	8,080	14,540
w199916	2.5	37.0	45.9	14.6	5.1	67.4	1.3	9.0	2.7	6,770	12,180
	---	37.9	47.1	15.0	4.9	69.1	1.3	7.0	2.8	6,940	12,500
	---	44.6	55.4	---	5.8	81.3	1.6	8.2	3.3	8,160	14,700
w199917	1.4	37.5	38.0	23.1	4.5	56.5	.9	4.7	10.4	5,940	10,690
	---	38.0	38.5	23.4	4.4	57.3	.9	3.5	10.5	6,020	10,840
	---	49.7	50.3	---	5.8	74.8	1.2	4.6	13.8	7,870	14,160
w199918	1.0	40.2	35.6	23.2	4.7	57.9	1.2	2.7	10.4	6,150	11,070
	---	40.6	36.0	23.4	4.6	58.5	1.2	1.8	10.5	6,210	11,190
	---	53.0	47.0	---	6.1	76.4	1.6	2.4	13.7	8,120	14,610
w199919	1.7	41.9	47.1	9.3	5.3	72.4	1.2	8.5	3.2	7,310	13,170
	---	42.6	47.9	9.5	5.2	73.7	1.2	7.1	3.3	7,440	13,390
	---	47.1	52.9	---	5.7	81.3	1.3	7.9	3.6	8,220	14,790
w199920	2.3	36.9	48.1	12.7	5.0	71.1	1.4	6.9	2.9	7,030	12,660
	---	37.8	49.2	13.0	4.9	72.8	1.4	5.0	3.0	7,200	12,960
	---	43.4	56.6	---	5.6	83.6	1.6	5.7	3.4	8,280	14,900
w199921	2.9	34.7	42.7	19.7	4.9	62.8	1.1	8.7	2.8	6,270	11,290
	---	35.7	44.0	20.3	4.7	64.7	1.1	6.3	2.9	6,460	11,630
	---	44.8	55.2	---	5.9	81.1	1.4	7.9	3.6	8,110	14,590
w199922	1.5	40.2	46.0	12.3	5.2	69.3	1.3	6.9	5.0	7,080	12,750
	---	40.8	46.7	12.5	5.1	70.4	1.3	5.7	5.1	7,190	12,950
	---	46.6	53.4	---	5.8	80.4	1.5	6.5	5.8	8,220	14,790
w199923	1.6	39.9	47.7	10.8	5.1	70.5	.9	7.5	5.2	7,180	12,930
	---	40.5	48.5	11.0	5.0	71.6	.9	6.2	5.3	7,300	13,140
	---	45.5	54.5	---	5.6	80.5	1.0	6.9	5.9	8,200	14,760
w199924	2.2	28.5	22.1	47.2	4.0	40.1	.8	6.5	1.4	4,140	7,440
	---	29.1	22.6	48.3	3.8	41.0	.8	4.6	1.4	4,230	7,610
	---	56.3	43.7	---	7.4	79.2	1.6	9.0	2.8	8,170	14,710
w199926	1.8	40.8	44.2	13.2	4.9	66.0	1.1	6.9	8.0	6,760	12,180
	---	41.5	45.0	13.4	4.8	67.2	1.1	5.4	8.1	6,890	12,400
	---	48.0	52.0	---	5.5	77.6	1.3	6.2	9.4	7,960	14,330

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio--continued

Sample number	Air-dried loss	Forms of sulfur: Sulfate	Forms of sulfur: Pyritic	Forms of sulfur: Organic	Free swelling	Ash fusion temperature C: Initial deform.	Ash fusion temperature C: soften.	Ash fusion temperature C: fluid
w199914	0.0	0.26	3.51	1.51	5.0	1,095	1,120	1,275
	---	.26	3.56	1.53				
	---	.32	4.29	1.85				
w199915	.0	.15	4.66	1.15	5.0	1,165	1,220	1,320
	---	.15	4.77	1.18				
	---	.17	5.42	1.34				
w199916	1.0	.02	1.81	.89	4.0	1,155	1,210	1,270
	---	.02	1.86	.91				
	---	.02	2.18	1.07				
w199917	.0	.54	8.08	1.75	5.0	1,140	1,155	1,170
	---	.55	8.19	1.77				
	---	.72	10.70	2.32				
w199918	.0	.04	8.97	1.35	4.0	1,130	1,150	1,165
	---	.04	9.06	1.36				
	---	.05	11.83	1.78				
w199919	.0	.09	1.68	1.46	5.0	1,175	1,210	1,375
	---	.09	1.71	1.49				
	---	.10	1.89	1.64				
w199920	.8	.02	2.26	.62	5.0	1,150	1,215	1,265
	---	.02	2.31	.63				
	---	.02	2.66	.73				
w199921	1.5	.04	1.85	.87	5.0	1,290	1,345	1,400
	---	.04	1.91	.90				
	---	.05	2.39	1.12				
w199922	.3	.05	2.90	2.03	5.0	1,095	1,150	1,205
	---	.05	2.94	2.06				
	---	.06	3.36	2.35				
w199923	.0	.05	3.93	1.18	6.0	1,145	1,170	1,375
	---	.05	3.99	1.20				
	---	.06	4.49	1.35				
w199924	.7	.03	1.11	.22	1.0	1,540	1,540	1,540
	---	.03	1.13	.22				
	---	.06	2.19	.43				
w199926	.0	.41	5.76	1.80	5.0	1,170	1,225	1,325
	---	.42	5.87	1.83				
	---	.48	6.78	2.12				

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio--continued

Sample number	Proximate Analysis: Moisture	Volatile matter	Fixed carbon	Ash	Ultimate Analysis: Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Heat of Combustion: Kcal/kg	Btu/lb
w199927	1.6	39.2	44.4	14.8	5.2	68.0	1.1	7.7	3.1	6,840	12,320
	---	39.8	45.1	15.0	5.1	69.1	1.1	6.4	3.2	6,960	12,520
	---	46.9	53.1	---	6.0	81.3	1.3	7.5	3.7	8,190	14,740
w199928	1.9	39.4	43.0	15.7	5.2	67.3	1.2	8.3	2.3	6,840	12,310
	---	40.2	43.8	16.0	5.1	68.6	1.2	6.7	2.3	6,970	12,550
	---	47.8	52.2	---	6.1	81.7	1.5	8.0	2.8	8,300	14,940
w199929	1.7	31.8	35.0	31.5	4.3	52.6	1.0	6.2	4.5	5,370	9,660
	---	32.3	35.6	32.0	4.2	53.5	1.0	4.8	4.6	5,460	9,830
	---	47.6	52.4	---	6.2	78.7	1.5	7.0	6.7	8,030	14,460
w199930	1.9	42.8	44.5	10.8	5.4	70.2	1.3	7.1	5.3	7,210	12,980
	---	43.6	45.4	11.0	5.3	71.6	1.3	5.5	5.4	7,350	13,240
	---	49.0	51.0	---	5.9	80.4	1.5	6.2	6.1	8,260	14,870
w199931	1.8	26.4	27.5	44.3	3.5	42.4	.7	4.9	4.1	4,260	7,660
	---	26.9	28.0	45.1	3.4	43.2	.7	3.4	4.2	4,340	7,800
	---	49.0	51.0	---	6.1	78.7	1.3	6.1	7.6	7,900	14,220
w199741	2.8	35.9	49.3	12.0	5.2	70.3	1.3	8.9	2.4	7,010	12,620
	---	36.9	50.7	12.3	5.0	72.3	1.3	6.6	2.5	7,210	12,990
	---	42.1	57.9	---	5.7	82.5	1.5	7.5	2.8	8,230	14,820
w199742	2.5	42.2	46.0	9.3	5.4	69.9	1.2	9.8	4.3	7,260	13,070
	---	43.3	47.2	9.5	5.3	71.7	1.2	7.8	4.4	7,450	13,410
	---	47.8	52.2	---	5.8	79.3	1.4	8.6	4.9	8,240	14,820
w199743	3.1	38.7	49.4	8.8	5.2	72.3	1.4	9.7	2.6	7,260	13,070
	---	39.9	51.0	9.1	5.0	74.6	1.4	7.2	2.7	7,490	13,480
	---	43.9	56.1	---	5.5	82.1	1.6	7.9	3.0	8,240	14,830
w199744	1.4	36.5	35.0	27.1	4.5	58.0	1.0	6.1	3.2	5,920	10,650
	---	37.0	35.5	27.5	4.4	58.8	1.0	4.9	3.2	6,000	10,800
	---	51.0	49.0	---	6.1	81.1	1.4	6.8	4.5	8,280	14,900
w200975	1.8	34.4	41.6	22.2	4.7	60.4	1.0	7.7	3.9	6,150	11,070
	---	35.0	42.4	22.6	4.6	61.5	1.0	6.2	4.0	6,260	11,270
	---	45.3	54.7	---	5.9	79.5	1.3	8.0	5.1	8,090	14,570
w200976	2.8	40.1	47.1	10.0	5.1	69.5	1.2	9.6	4.7	7,010	12,610
	---	41.3	48.5	10.3	4.9	71.5	1.2	7.3	4.8	7,210	12,970
	---	46.0	54.0	---	5.5	79.7	1.4	8.2	5.4	8,030	14,460
w200977	2.7	43.0	48.6	5.7	5.6	74.7	1.3	10.3	2.3	7,530	13,550
	---	44.2	49.9	5.9	5.4	76.8	1.3	8.1	2.4	7,740	13,930
	---	46.9	53.1	---	5.8	81.6	1.4	8.6	2.5	8,220	14,790

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w199927	0.0	0.06	2.50	0.54	5.0	1,170	1,200	1,310
	---	.06	2.54	.55				
	---	.07	2.99	.65				
w199928	.7	.02	1.00	1.27	7.0	1,320	1,375	1,430
	---	.02	1.02	1.29				
	---	.02	1.21	1.54				
w199929	.5	.12	3.00	1.38	5.0	1,325	1,375	1,430
	---	.12	3.05	1.40				
	---	.18	4.49	2.07				
w199930	.6	.26	3.58	1.44	6.0	1,070	1,125	1,180
	---	.27	3.65	1.47				
	---	.30	4.10	1.65				
w199931	.0	.03	3.33	.74	1.0	1,205	1,270	1,425
	---	.03	3.39	.75				
	---	.06	6.18	1.37				
w199741	1.1	.01	2.03	.37	5.0	1,125	1,180	1,235
	---	.01	2.09	.38				
	---	.01	2.38	.43				
w199742	.9	.02	2.84	1.49	4.0	1,180	1,230	1,295
	---	.02	2.91	1.53				
	---	.02	3.22	1.69				
w199743	1.3	.02	2.03	.57	6.0	1,180	1,235	1,290
	---	.02	2.09	.59				
	---	.02	2.30	.65				
w199744	.5	.01	2.62	.53	1.0	1,235	1,290	1,345
	---	.01	2.66	.54				
	---	.01	3.66	.74				
w200975	.2	.13	2.64	1.17	6.0	1,115	1,145	1,320
	---	.13	2.69	1.19				
	---	.17	3.47	1.54				
w200976	.4	.38	3.20	1.07	4.5	1,080	1,110	1,140
	---	.39	3.29	1.10				
	---	.44	3.67	1.23				
w200977	.4	.08	.71	1.54	4.5	1,170	1,200	1,290
	---	.08	.73	1.58				
	---	.09	.78	1.68				

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio--continued

Sample number	Proximate Analysis: Moisture	Volatile matter	Fixed carbon	Ash	Ultimate Analysis: Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Heat of Combustion: Kcal/kg	Btu/lb
w200978	3.8	34.3	50.0	11.9	5.1	68.6	1.2	12.0	1.1	6,800	12,230
	---	35.7	52.0	12.4	4.9	71.3	1.2	9.0	1.1	7,060	12,720
	---	40.7	59.3	---	5.5	81.4	1.4	10.2	1.3	8,060	14,510
w200979	3.2	40.8	47.2	8.8	5.3	69.2	1.2	10.6	4.8	7,010	12,620
	---	42.1	48.8	9.1	5.1	71.5	1.2	8.0	5.0	7,240	13,040
	---	46.4	53.6	---	5.6	78.6	1.4	8.8	5.5	7,970	14,340
w200980	2.5	38.6	47.0	11.9	5.1	68.8	1.1	9.3	3.7	6,950	12,500
	---	39.6	48.2	12.2	4.9	70.6	1.1	7.3	3.8	7,120	12,820
	---	45.1	54.9	---	5.6	80.4	1.3	8.3	4.3	8,110	14,610
w200981	3.4	39.1	44.7	12.8	5.2	67.3	1.1	8.7	4.7	6,770	12,180
	---	40.5	46.3	13.3	5.0	69.7	1.1	5.9	4.9	7,010	12,610
	---	46.7	53.3	---	5.8	80.3	1.3	6.8	5.6	8,080	14,540
w200982	3.9	33.7	52.1	10.3	5.1	71.7	1.1	10.9	.9	7,040	12,670
	---	35.1	54.2	10.7	4.9	74.6	1.1	7.7	.9	7,330	13,190
	---	39.3	60.7	---	5.4	83.6	1.3	8.7	1.0	8,200	14,770
w200983	2.9	38.8	50.0	8.3	5.3	72.8	1.3	9.4	2.8	7,280	13,110
	---	40.0	51.5	8.5	5.1	75.0	1.3	7.0	2.9	7,500	13,500
	---	43.7	56.3	---	5.6	82.0	1.5	7.7	3.2	8,200	14,770
w200984	2.0	43.4	49.1	5.5	5.5	76.1	1.3	8.5	3.1	7,620	13,710
	---	44.3	50.1	5.6	5.4	77.7	1.3	6.9	3.2	7,770	13,990
	---	46.9	53.1	---	5.7	82.3	1.4	7.3	3.4	8,230	14,820
w200986	2.1	40.8	48.5	8.6	5.4	71.5	1.3	8.2	5.0	7,280	13,100
	---	41.7	49.5	8.8	5.3	73.0	1.3	6.5	5.1	7,430	13,380
	---	45.7	54.3	---	5.8	80.1	1.5	7.1	5.6	8,150	14,670
w200987	2.4	26.6	28.4	42.6	3.5	41.7	.6	6.6	4.9	4,260	7,660
	---	27.3	29.1	43.6	3.3	42.7	.6	4.6	5.0	4,360	7,850
	---	48.4	51.6	---	5.9	75.8	1.1	8.1	8.9	7,740	13,930
w200988	3.7	36.0	49.9	10.4	5.4	70.4	1.2	10.4	2.3	6,980	12,560
	---	37.4	51.8	10.8	5.2	73.1	1.2	7.4	2.4	7,250	13,040
	---	41.9	58.1	---	5.8	82.0	1.4	8.3	2.7	8,120	14,620
w200989	2.5	36.6	43.9	17.0	4.9	65.2	1.0	8.8	3.1	6,540	11,770
	---	37.5	45.0	17.4	4.7	66.9	1.0	6.7	3.2	6,710	12,070
	---	45.5	54.5	---	5.7	81.0	1.2	8.2	3.9	8,120	14,620
w201713	1.8	41.2	44.5	12.5	5.4	69.8	1.3	8.7	2.3	7,170	12,900
	---	42.0	45.3	12.7	5.3	71.1	1.3	7.2	2.3	7,300	13,140
	---	48.1	51.9	---	6.1	81.4	1.5	8.3	2.7	8,370	15,060

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio--continued

Sample number	Air-dried loss	Forms of sulfur: Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C: Initial deform.	soften.	fluid
w200978	0.5	0.03	0.41	0.68	4.0	1,600	1,600G	1,600G
	---	.03	.43	.71				
	---	.04	.49	.81				
w200979	.4	.34	2.56	1.87	4.5	1,115	1,145	1,365
	---	.35	2.64	1.93				
	---	.39	2.91	2.12				
w200980	.4	.09	1.81	1.83	5.0	1,115	1,170	1,290
	---	.09	1.86	1.88				
	---	.11	2.11	2.14				
w200981	.7	.34	1.98	2.40	5.0	1,100	1,125	1,160
	---	.35	2.05	2.48				
	---	.41	2.36	2.86				
w200982	.9	.03	.21	.67	4.0	1,565	1,600	1,600G
	---	.03	.22	.70				
	---	.03	.24	.78				
w200983	.4	.16	1.55	1.05	5.0	1,100	1,165	1,290
	---	.16	1.60	1.08				
	---	.18	1.75	1.18				
w200984	.2	.19	1.12	1.75	6.5	1,160	1,205	1,290
	---	.19	1.14	1.79				
	---	.21	1.21	1.89				
w200986	.1	.15	2.87	1.95	5.0	1,105	1,130	1,290
	---	.15	2.93	1.99				
	---	.17	3.21	2.18				
w200987	.5	.06	3.93	.93	1.0	1,230	1,305	1,600
	---	.06	4.03	.95				
	---	.11	7.15	1.69				
w200988	.8	.09	1.39	.78	5.5	1,175	1,225	1,320
	---	.09	1.44	.81				
	---	.10	1.62	.91				
w200989	.3	.07	1.52	1.47	5.0	1,230	1,265	1,490
	---	.07	1.56	1.51				
	---	.09	1.89	1.83				
w201713	.3	.01	1.24	1.08	5.0	1,470	1,525	1,600
	---	.01	1.26	1.10				
	---	.01	1.45	1.26				

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio--continued

		Proximate Analysis			Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
W201714	2.9	38.1	41.2	17.8	4.9	63.0	1.5	7.8	5.0	6,420	11,550
	---	39.2	42.4	18.3	4.7	64.9	1.5	5.4	5.1	6,610	11,890
	---	48.0	52.0	---	5.8	79.4	1.9	6.6	6.3	8,090	14,560
W201715	2.3	35.8	40.7	21.2	4.7	60.4	1.3	7.5	4.9	6,120	11,020
	---	36.6	41.7	21.7	4.5	61.8	1.3	5.6	5.0	6,270	11,280
	---	46.8	53.2	---	5.8	79.0	1.7	7.1	6.4	8,000	14,410
W201716	2.8	35.1	47.7	14.4	5.0	68.0	1.3	8.2	3.2	6,810	12,250
	---	36.1	49.1	14.8	4.8	70.0	1.3	5.9	3.3	7,000	12,600
	---	42.4	57.6	---	5.7	82.1	1.6	6.9	3.9	8,220	14,800
W201717	2.5	40.6	46.1	10.8	5.4	70.6	1.3	8.4	3.5	7,200	12,950
	---	41.6	47.3	11.1	5.3	72.4	1.3	6.3	3.6	7,380	13,280
	---	46.8	53.2	---	5.9	81.4	1.5	7.1	4.0	8,300	14,940
W201718	1.6	43.5	43.5	11.4	5.2	69.1	1.2	6.4	6.7	7,190	12,940
	---	44.2	44.2	11.6	5.1	70.2	1.2	5.1	6.8	7,310	13,150
	---	50.0	50.0	---	5.8	79.4	1.4	5.7	7.7	8,260	14,880
W201719	1.6	37.0	45.7	15.7	5.0	68.2	1.2	7.6	2.4	6,850	12,340
	---	37.6	46.4	16.0	4.9	69.3	1.2	6.3	2.4	6,970	12,540
	---	44.7	55.3	---	5.8	82.5	1.5	7.5	2.9	8,290	14,920
W201720	2.1	43.2	42.9	11.8	5.2	68.2	1.1	7.4	6.3	6,990	12,570
	---	44.1	43.8	12.1	5.1	69.7	1.1	5.7	6.4	7,140	12,840
	---	50.2	49.8	---	5.8	79.2	1.3	6.4	7.3	8,110	14,610
W201721	1.4	42.0	45.2	11.4	5.3	71.4	1.3	6.0	4.7	7,270	13,090
	---	42.6	45.8	11.6	5.2	72.4	1.3	4.8	4.8	7,380	13,280
	---	48.2	51.8	---	5.9	81.9	1.5	5.5	5.4	8,340	15,010
W201580	2.5	27.1	27.5	42.9	3.7	42.2	.9	8.2	2.1	4,210	7,580
	---	27.8	28.2	44.0	3.5	43.3	.9	6.1	2.2	4,320	7,780
	---	49.6	50.4	---	6.3	77.3	1.6	10.9	3.8	7,720	13,890
W201581	2.5	43.3	40.1	14.1	5.2	66.5	1.1	7.4	5.7	6,740	12,130
	---	44.4	41.1	14.5	5.0	68.2	1.1	5.3	5.8	6,910	12,440
	---	51.9	48.1	---	5.9	79.7	1.3	6.2	6.8	8,080	14,550
W201582	3.1	35.3	37.8	23.8	4.6	55.7	1.0	7.4	7.5	5,720	10,300
	---	36.4	39.0	24.6	4.4	57.5	1.0	4.8	7.7	5,900	10,630
	---	48.3	51.7	---	5.8	76.2	1.4	6.4	10.3	7,830	14,090
W201583	4.1	31.4	37.6	26.9	4.3	52.7	1.0	8.8	6.3	5,380	9,690
	---	32.7	39.2	28.1	4.0	55.0	1.0	5.4	6.6	5,610	10,100
	---	45.5	54.5	---	5.6	76.4	1.4	7.5	9.1	7,800	14,040

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w201714	0.8	0.16	2.66	2.23	6.0	1,060	1,105	1,290
	---	.16	2.74	2.30				
	---	.20	3.35	2.81				
w201715	.3	.08	3.48	1.36	5.0	1,170	1,190	1,205
	---	.08	3.56	1.39				
	---	.10	4.55	1.78				
w201716	.9	.08	2.48	.67	5.5	1,165	1,175	1,200
	---	.08	2.55	.69				
	---	.10	3.00	.81				
w201717	.9	.04	1.93	1.56	6.5	1,260	1,410	1,465
	---	.04	1.98	1.60				
	---	.05	2.23	1.80				
w201718	.2	.10	5.09	1.52	7.5	1,270	1,300	1,355
	---	.10	5.17	1.54				
	---	.11	5.85	1.75				
w201719	.2	.02	1.54	.80	4.5	1,600	1,600G	1,600G
	---	.02	1.57	.81				
	---	.02	1.86	.97				
w201720	.4	.14	3.75	2.43	6.0	1,050	1,075	1,280
	---	.14	3.83	2.48				
	---	.16	4.36	2.82				
w201721	.1	.06	3.53	1.08	7.0	1,040	1,050	1,105
	---	.06	3.58	1.10				
	---	.07	4.05	1.24				
w201580	1.2	.01	1.48	.60	1.0	1,600	1,600G	1,600G
	---	.01	1.52	.62				
	---	.02	2.71	1.10				
w201581	1.1	.08	2.67	2.99	6.0	1,060	1,115	1,165
	---	.08	2.74	3.07				
	---	.10	3.20	3.59				
w201582	1.6	.46	4.63	2.41	4.0	1,055	1,100	1,150
	---	.47	4.78	2.49				
	---	.63	6.33	3.30				
w201583	2.4	.16	4.14	2.00	4.0	1,095	1,150	1,200
	---	.17	4.32	2.09				
	---	.23	6.00	2.90				

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w201584	3.5	31.0	34.4	31.1	4.2	51.7	0.9	7.9	4.1	5,250	9,460
	---	32.1	35.6	32.2	3.9	53.6	.9	5.0	4.2	5,450	9,800
	---	47.4	52.6	---	5.8	79.1	1.4	7.3	6.3	8,040	14,460
w201585	2.7	40.2	47.5	9.6	5.5	71.7	1.4	8.5	3.4	7,280	13,110
	---	41.3	48.8	9.9	5.3	73.7	1.4	6.3	3.5	7,490	13,470
	---	45.8	54.2	---	5.9	81.8	1.6	7.0	3.9	8,310	14,950
w201586	2.3	37.7	41.0	19.0	4.8	62.4	1.1	6.5	6.1	6,410	11,530
	---	38.6	42.0	19.4	4.7	63.9	1.1	4.6	6.2	6,560	11,810
	---	47.9	52.1	---	5.8	79.3	1.4	5.7	7.8	8,140	14,660
w201587	1.8	34.3	38.2	25.7	4.5	59.8	1.1	6.2	2.7	6,040	10,870
	---	34.9	38.9	26.2	4.4	60.9	1.1	4.7	2.7	6,150	11,070
	---	47.3	52.7	---	5.9	82.5	1.5	6.3	3.7	8,330	14,990
w201589	3.0	41.4	45.7	9.9	5.5	70.3	1.4	9.2	3.7	7,150	12,860
	---	42.7	47.1	10.2	5.3	72.5	1.4	6.7	3.8	7,370	13,260
	---	47.5	52.5	---	5.9	80.7	1.6	7.5	4.2	8,210	14,770
w201590	2.9	44.0	45.3	7.8	5.7	72.4	1.3	9.6	3.3	7,360	13,250
	---	45.3	46.7	8.0	5.5	74.6	1.3	7.2	3.4	7,580	13,650
	---	49.3	50.7	---	6.0	81.1	1.5	7.9	3.7	8,240	14,840
w201592	2.5	41.9	44.6	11.0	5.5	70.5	1.4	8.0	3.5	7,200	12,960
	---	43.0	45.7	11.3	5.4	72.3	1.4	5.9	3.6	7,380	13,290
	---	48.4	51.6	---	6.0	81.5	1.6	6.7	4.0	8,320	14,980
w201593	2.5	36.1	39.4	22.0	4.8	61.0	1.1	8.4	2.6	6,190	11,140
	---	37.0	40.4	22.6	4.6	62.6	1.1	6.3	2.7	6,350	11,430
	---	47.8	52.2	---	6.0	80.8	1.5	8.2	3.4	8,200	14,760
w201594	2.5	39.5	45.0	13.0	5.3	68.7	1.3	7.3	4.4	6,980	12,560
	---	40.5	46.2	13.3	5.2	70.5	1.3	5.2	4.5	7,160	12,890
	---	46.7	53.3	---	5.9	81.3	1.5	6.0	5.2	8,260	14,870
w201595	3.2	36.7	40.7	19.4	4.9	62.3	1.0	8.2	4.2	6,320	11,370
	---	37.9	42.0	20.0	4.7	64.4	1.0	5.5	4.3	6,530	11,750
	---	47.4	52.6	---	5.9	80.5	1.3	6.9	5.4	8,160	14,690
w201596	2.9	41.0	45.9	10.2	5.4	71.6	1.3	8.7	2.8	7,210	12,970
	---	42.2	47.3	10.5	5.2	73.7	1.3	6.3	2.9	7,420	13,360
	---	47.2	52.8	---	5.8	82.4	1.5	7.0	3.2	8,290	14,930
w201597	2.7	27.6	29.2	40.5	3.9	45.6	.8	7.1	2.1	4,570	8,220
	---	28.4	30.0	41.6	3.7	46.9	.8	4.8	2.2	4,690	8,450
	---	48.6	51.4	---	6.3	80.3	1.4	8.3	3.7	8,040	14,470

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio--continued

Sample number	Air-dried loss	Forms of sulfur			Free swelling	Ash fusion temperature C		
		Sulfate	Pyritic	Organic		Initial deform	soften.	fluid
W201584	1.8	0.01	2.56	1.50	4.0	1,120	1,180	1,225
	---	.01	2.65	1.55				
	---	.02	3.91	2.29				
W201585	1.2	.01	2.32	1.05	6.0	1,065	1,130	1,190
	---	.01	2.38	1.08				
	---	.01	2.65	1.20				
W201586	1.0	.03	3.41	2.64	4.5	1,080	1,130	1,170
	---	.03	3.49	2.70				
	---	.04	4.33	3.35				
W201587	.7	.01	1.50	1.16	6.5	1,600	1,600G	1,600G
	---	.01	1.53	1.18				
	---	.01	2.07	1.60				
W201589	1.5	.01	2.90	.75	4.0	1,125	1,180	1,230
	---	.01	2.99	.77				
	---	.01	3.33	.86				
W201590	1.5	.05	2.00	1.23	6.0	1,130	1,180	1,240
	---	.05	2.06	1.27				
	---	.06	2.24	1.38				
W201592	1.2	.01	2.91	.60	5.0	1,125	1,175	1,240
	---	.01	2.98	.62				
	---	.01	3.36	.69				
W201593	1.2	.01	1.26	1.35	6.5	1,355	1,415	1,460
	---	.01	1.29	1.38				
	---	.01	1.67	1.79				
W201594	1.2	.05	1.61	2.73	7.0	1,095	1,140	1,180
	---	.05	1.65	2.80				
	---	.06	1.91	3.23				
W201595	1.8	.01	1.75	2.40	4.5	1,115	1,175	1,220
	---	.01	1.81	2.48				
	---	.01	2.26	3.10				
W201596	1.5	.01	1.13	1.62	6.5	1,130	1,200	1,255
	---	.01	1.16	1.67				
	---	.01	1.30	1.86				
W201597	1.2	.01	1.18	.93	1.5	1,360	1,420	1,470
	---	.01	1.21	.96				
	---	.02	2.08	1.64				

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
W201598	3.1	38.2	48.3	10.4	5.3	70.7	1.3	9.0	3.3	7,060	12,710
	---	39.4	49.8	10.7	5.1	73.0	1.3	6.4	3.4	7,290	13,110
	---	44.2	55.8	---	5.7	81.7	1.5	7.2	3.8	8,160	14,690
W201599	3.9	38.3	43.0	14.8	5.3	66.6	1.2	9.4	2.7	6,630	11,930
	---	39.9	44.7	15.4	5.1	69.3	1.2	6.2	2.8	6,900	12,420
	---	47.1	52.9	---	6.0	81.9	1.5	7.3	3.3	8,150	14,680
W201600	3.0	36.3	37.6	23.1	4.5	57.8	1.1	9.1	4.4	5,980	10,760
	---	37.4	38.8	23.8	4.3	59.6	1.1	6.6	4.5	6,160	11,090
	---	49.1	50.9	---	5.6	78.2	1.5	8.7	6.0	8,090	14,560
W201601	3.4	31.8	34.9	29.9	4.4	53.6	1.0	6.4	4.7	5,380	9,680
	---	32.9	36.1	31.0	4.2	55.5	1.0	3.5	4.9	5,560	10,020
	---	47.7	52.3	---	6.0	80.4	1.5	5.1	7.0	8,060	14,510
W201602	2.3	42.5	41.9	13.3	5.2	67.3	1.3	8.4	4.4	6,910	12,430
	---	43.5	42.9	13.6	5.1	68.9	1.3	6.5	4.5	7,070	12,730
	---	50.4	49.6	---	5.9	79.7	1.5	7.5	5.2	8,190	14,730
W201603	2.9	27.5	26.4	43.2	3.6	41.6	.7	6.3	4.6	4,200	7,560
	---	28.3	27.2	44.5	3.4	42.8	.7	3.8	4.7	4,330	7,790
	---	51.0	49.0	---	6.1	77.2	1.3	6.9	8.5	7,800	14,040

Table 6e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 101 bituminous coal samples from Ohio--continued

Sample number	Air-dried loss	Forms of sulfur Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C Initial deform.	soften.	fluid
w201598	1.4	0.01	2.52	0.73	5.5	1,090	1,150	1,200
	---	.01	2.60	.75				
	---	.01	2.91	.84				
w201599	2.2	.01	1.06	1.63	5.5	1,190	1,240	1,290
	---	.01	1.10	1.70				
	---	.01	1.30	2.00				
w201600	1.5	.03	1.69	2.72	5.5	1,095	1,160	1,205
	---	.03	1.74	2.80				
	---	.04	2.29	3.68				
w201601	1.7	.03	1.92	2.73	5.0	1,070	1,125	1,175
	---	.03	1.99	2.83				
	---	.04	2.88	4.09				
w201602	.9	.02	2.62	1.76	5.5	1,070	1,140	1,190
	---	.02	2.68	1.80				
	---	.02	3.10	2.09				
w201603	1.2	.02	2.26	2.32	1.0	1,165	1,225	1,290
	---	.02	2.33	2.39				
	---	.04	4.19	4.30				

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio.

[Values in percent or parts-per-million. Coal ashed at 525 C. L means less than the value shown; N, not detected; B, not determined; S after element title indicates determinations by automatic plate reading computer assisted, emission spectographic analyses. The standard deviation of any single answer should be taken as plus 50% and minus 35%. Methods of analyses for other elements as shown in figure 1.]

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w198978	10.1	43	17	2.5	0.70	0.40	1.9	28	0.82	0.11	w198978
w198979	11.6	49	19	.80	.53	.23	1.6	27	.96	.05	w198979
w198980	9.4	41	22	.70	.53	.29	1.7	29	.90	.04	w198980
w198981	33.0	57	26	.75	1.1	.41	2.5	8.9	1.2	.15	w198981
w198982	33.2	55	26	.71	1.1	.41	2.4	11	1.2	.11	w198982
w198983	11.9	45	24	1.4	.75	.34	1.6	21	1.2	.13	w198983
w198984	10.8	50	24	.82	.66	.25	1.8	20	1.2	.06	w198984
w198985	8.5	49	21	2.3	1.4	.32	2.1	17	1.1	.13	w198985
w198986	20.7	48	21	.74	.85	.20	2.6	23	.92	.05	w198986
w198987	16.9	42	15	7.6	3.0	.24	1.9	19	.74	.02	w198987
w198988	17.4	51	24	.87	.93	.23	2.8	15	1.1	.42	w198988
w198989	11.8	46	21	.83	.58	.23	1.6	27	1.1	.03	w198989
w198990	9.1	45	22	1.2	.66	.30	1.8	27	1.1	.22	w198990
w198991	7.5	21	15	2.6	.38	.36	.37	53	.39	.60	w198991
w198992	11.6	37	23	1.3	.55	.23	1.3	33	.99	.38	w198992
w198993	11.6	37	22	1.1	.56	.23	1.2	34	1.0	.19	w198993
w198995	10.1	46	26	1.6	.61	.27	1.3	20	1.3	.11	w198995
w198996	21.6	43	15	.90	.96	.25	2.4	33	.76	.05	w198996
w198997	23.4	51	20	.65	1.2	.40	2.7	19	.88	.10	w198997
w198998	20.1	43	17	.70	.90	.13	2.4	31	.90	B	w198998
w199933	8.8	32	21	1.8	.38	.31	1.0	35	.87	.01	w199933
w199934	17.1	40	21	3.5	.70	.35	1.8	22	.95	.11	w199934
w199935	17.4	47	24	.79	.86	.39	2.5	17	1.2	.01	w199935
w199936	19.0	39	21	1.1	.53	.43	1.7	29	.90	.01	w199936
w199937	12.6	47	27	3.0	.93	.32	2.5	11	1.3	.11	w199937
w199939	9.5	23	15	2.3	.30	.28	.31	52	.37	.01	w199939
w199940	7.8	36	24	2.4	.58	.35	1.7	26	1.2	.01	w199940
w199941	18.3	45	20	.43	.55	.37	1.8	27	.89	.02	w199941
w199942	20.6	49	23	.96	.81	.52	2.4	16	1.2	.04	w199942
w199943	18.8	41	19	1.6	.71	.50	2.2	26	.95	.01	w199943
w199944	18.4	51	25	1.8	1.0	.51	2.6	9.1	1.3	.01	w199944
w199945	13.1	51	25	1.3	.56	.41	1.9	9.7	1.7	.02	w199945
w199946	31.2	37	22	.28	.63	.48	2.7	29	1.1	.03	w199946
w199947	25.3	47	27	3.1	.90	.48	3.0	9.2	1.0	.02	w199947
w199948	11.3	41	18	5.5	.51	.48	1.2	21	.73	.01	w199948
w199914	14.9	40	19	2.5	.68	.45	1.7	28	.85	.01	w199914
w199915	10.0	26	16	4.1	.41	.40	1.3	47	.72	.01	w199915
w199916	15.7	45	23	1.8	.75	.43	2.3	22	1.1	.07	w199916
w199917	19.9	28	15	1.1	.23	.34	.76	51	.75	.05	w199917
w199918	18.1	33	17	1.3	.38	.22	1.5	43	1.0	.01	w199918

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio--continued

Sample number	SO3 (percent)	Ag-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w198978	3.6	0.20	700	200	10	0.64	99	22	100	7.9	w198978
w198979	.08	.20	500	180	10	.47	86	19	100	6.9	w198979
w198980	1.3	.20	700	200	13	.45	110	34	120	9.6	w198980
w198981	1.2	.10L	160	340	7.0	.19	120	24	140	12	w198981
w198982	1.1	.10	180	310	7.0	.21	110	23	130	12	w198982
w198983	2.1	.10L	1,000	220	21	.30	130	27	150	5.9	w198983
w198984	1.4	.20	500	270	12	.55	120	36	160	10	w198984
w198985	4.9	.10L	700	360	10	.30	94	9.4	120	11	w198985
w198986	1.4	.20	230	200	11	.50	120	79	100	9.2	w198986
w198987	5.7	.10L	320	220	4.0	.38	89	17	79	7.1	w198987
w198988	1.6	.20	320	370	9.0	.30	110	25	120	9.8	w198988
w198989	1.5	.20	320	210	6.0	.30	85	22	110	7.6	w198989
w198990	2.0	.10L	500	240	14	.62	99	22	110	8.8	w198990
w198991	4.9	.40	1,200	230	15	1.0	270	93	230	9.3	w198991
w198992	2.2	.40	700	210	14	.76	100	34	45	.9	w198992
w198993	2.3	.30	700	350	15	.72	270	78	160	6.9	w198993
w198995	2.8	.30	700	200	11	.32	130	34	230	6.9	w198995
w198996	2.0	.20	500	180	16	.28	65	27	71	8.8	w198996
w198997	1.9	.10L	280	290	13	.34	94	28	130	11	w198997
w198998	1.5	.10L	320	160	12	.38	90	47	91	11	w198998
w199933	1.3	.40	460	120	20	2.1	100	42	140	4.5	w199933
w199934	2.8	.10L	260	630	10	.50	120	32	130	7.6	w199934
w199935	.76	.20	290	190	12	.45	100	27	140	9.2	w199935
w199936	1.1	.30	220	230	14	.98	130	78	140	9.5	w199936
w199937	1.0	.50	370	1,100	10	.42	170	37	170	7.1	w199937
w199939	2.2	.50	1,000	230	9.0	.80	95	38	110	7.4L	w199939
w199940	1.9	.30	680	450	12	.81	120	38	160	6.4	w199940
w199941	.32	.20	170	240	9.0	.31	110	43	110	7.1	w199941
w199942	.76	.10L	170	560	9.0	.36	120	39	150	8.3	w199942
w199943	2.2	.30	190	690	7.0	.49	90	26	120	10	w199943
w199944	1.7	.10L	280	490	12	.65	110	18	140	11	w199944
w199945	1.3	.40	330	970	15	2.0	210	34	190	7.6	w199945
w199946	.49	.30	100	220	7.0	.70	140	25	120	8.7	w199946
w199947	2.6	.20	160	430	11	.73	140	46	160	11	w199947
w199948	5.7	.30	680	2,600	16	4.8	110	73	96	5.3	w199948
w199914	3.3	.40	400	1,000G	8.0	.80	87	21	96	6.7	w199914
w199915	3.0	.40	1,000G	1,700	25	.39	80	36	100	6.0	w199915
w199916	1.9	.10L	330	340	12	.29	110	37	130	8.9	w199916
w199917	2.1	.60	320	890	19	.55	130	94	80	5.5	w199917
w199918	2.0	.40	260	230	15	.51	130	34	100	6.6	w199918

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	In-S (ppm)	La (ppm)	Sample number
w198978	57	22L	10L	1.8	21	14	56	5.0	7.0L	50	w198978
w198979	46	22L	10L	1.8	22	7.0L	13	5.2	7.0L	52	w198979
w198980	64	22L	10L	2.1	23	7.0L	12	4.3	7.0L	53	w198980
w198981	57	22L	10L	2.2	26	7.0L	2.0L	5.8	7.0L	70	w198981
w198982	59	22L	10L	2.0	26	9.0	2.0L	5.7	7.0L	63	w198982
w198983	93	22L	10L	2.5	34	7.0L	13	5.9	7.0L	67	w198983
w198984	71	22L	10L	2.4	30	9.0	16	7.4	7.0L	65	w198984
w198985	49	22L	10L	1.8	29	14	8.0	5.9	7.0L	59	w198985
w198986	47	22L	10L	2.2	21	13	18	4.3	7.0L	63	w198986
w198987	38	22L	10L	1.5	14	10	3.0	4.1	7.0L	47	w198987
w198988	56	22L	10L	2.0	27	7.0L	21	5.2	7.0L	63	w198988
w198989	52	22L	10L	1.7	29	16	3.0	5.1	7.0L	51	w198989
w198990	67	22L	10L	2.0	28	7.0L	22	5.5	7.0L	55	w198990
w198991	97	22L	10L	5.5	42	21	5.0	8.0	7.0L	170	w198991
w198992	140	22L	10L	1.7	70	15	75	.9	7.0	52	w198992
w198993	110	22L	10L	4.6	42	7.0L	45	5.2	7.0L	160	w198993
w198995	110	22L	10L	3.0	47	14	9.0	7.9	7.0L	59	w198995
w198996	54	22L	10L	1.8	20	7.0L	26	3.7	7.0L	32	w198996
w198997	77	22L	10L	1.6	25	14	8.0	4.7	7.0L	47	w198997
w198998	56	22L	10L	1.7	36	7.0L	10	4.5	7.0L	40	w198998
w199933	150	22L	10L	3.1	42	20	67	4.5	7.0L	45	w199933
w199934	76	22L	10L	2.5	30	14	15	4.7	7.0L	70	w199934
w199935	79	22L	10L	2.4	30	12	26	5.2	7.0L	57	w199935
w199936	96	22L	10L	2.6	23	13	4.0	4.7	7.0L	68	w199936
w199937	130	22L	10L	3.7	40	13	13	5.6	7.0L	87	w199937
w199939	110	22L	10L	2.5	30	7.0L	35	2.1	7.0L	42	w199939
w199940	140	22	10L	2.8	41	15	60	6.4	7.0L	64	w199940
w199941	74	22L	10L	2.1	29	11	17	6.6	7.0L	60	w199941
w199942	62	22L	10L	1.8	35	11	37	6.3	7.0L	73	w199942
w199943	76	22L	10L	1.8	26	13	18	4.8	7.0L	53	w199943
w199944	72	22L	10L	2.1	32	13	32	6.5	7.0L	60	w199944
w199945	150	22L	10L	3.4	54	13	30	8.4	7.0L	110	w199945
w199946	180	22L	10L	2.3	35	7.0L	3.0	4.8	7.0L	77	w199946
w199947	180	22L	10L	2.6	38	12	4.0	4.7	7.0L	75	w199947
w199948	120	22L	10L	3.3	25	20	51	4.4	7.0L	53	w199948
w199914	56	23	10L	1.8	31	17	31	4.0	7.0L	47	w199914
w199915	94	22L	10L	1.8	44	13	110	3.0	7.0L	40	w199915
w199916	77	22L	10L	2.0	44	15	13	5.1	7.0L	64	w199916
w199917	60	25	10L	3.2	38	26	26	4.0	7.0L	65	w199917
w199918	91	22L	10L	2.5	42	20	9.0	5.0	7.0L	61	w199918

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Sample number
w198978	85	1	180	7.0	10	47	40	28	68L	440L	w198978
w198979	87	.9	79	8.0	12	46L	41	33	68L	330L	w198979
w198980	120	1	93	6.0	10	46L	49	35	68L	370L	w198980
w198981	390	.6	89	4.0	14	65	51	39	68L	180	w198981
w198982	410	.6	90	4.0	15	47	46	36	68L	160	w198982
w198983	190	.8	150	18	32	74	67	56	68L	320L	w198983
w198984	150	.9	110	6.0	11	46L	58	39	68L	320L	w198984
w198985	91	1	150	7.0	10	48	33	35	68L	360L	w198985
w198986	190	1	120	5.0	9	46L	53	23	68L	120	w198986
w198987	70	.6	390	5.0	7	46L	28	22	68L	220L	w198987
w198988	240	.6	120	15	10	46L	57	30	68L	190	w198988
w198989	130	.8	69	6.0	10	52	40	32	68L	270L	w198989
w198990	120	1	190	11	10	55	68	32	68L	350L	w198990
w198991	79	1	670	40	10	72	140	30	68L	480L	w198991
w198992	260	.9	130	12	10	68	150	69	68L	290L	w198992
w198993	250	2	120	9.0	10	47	71	89	68L	360L	w198993
w198995	210	1	150	12	10	52	50	42	68L	300L	w198995
w198996	43	.9	180	15	4	46L	48	95	68L	130	w198996
w198997	85	.9	180	6.0	8	46L	64	27	68L	230L	w198997
w198998	100	1	200	22	10	46L	45	40	68L	160	w198998
w199933	210	1	220	22	13	68	120	62	68L	510L	w199933
w199934	200	.6	330	11	5	74	62	38	68L	320L	w199934
w199935	400	1	160	7.0	8	46L	45	20	68L	320L	w199935
w199936	150	1	140	12	4	52	69	25	68L	320L	w199936
w199937	150	.8	160	15	5	47	80	52	68L	400L	w199937
w199939	140	1	190	45	7	58	89	10L	68L	530L	w199939
w199940	210	1	190	25	11	67	67	36	68L	640L	w199940
w199941	140	1	130	15	6	46L	50	52	68L	330L	w199941
w199942	260	1	200	18	9	55	71	36	68L	340L	w199942
w199943	210	1	210	15	13	54	56	10L	68L	370L	w199943
w199944	500	1	200	10	13	82	55	20	68L	330L	w199944
w199945	160	2	130	16	12	73	55	30	68L	380L	w199945
w199946	180	.6	140	15	10	52	49	100	68L	260L	w199946
w199947	290	.8	190	9.0	8	85	110	120	68L	170	w199947
w199948	120	.9	160	35	13	46L	220	46	68L	440L	w199948
w199914	98	1	180	22	15	78	40	10L	68L	340L	w199914
w199915	87	1	440	31	13	46L	96	66	68L	450L	w199915
w199916	170	1	200	14	11	71	110	91	68L	350L	w199916
w199917	100	1	110	7.0L	20	90	140	22	68L	280L	w199917
w199918	130	1	130	32	12	81	56	41	150L	330L	w199918

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio--continued

Sample number	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	U (ppm)	V-S (ppm)	W-S (ppm)	Sample number
w198978	19	8.9	2.0L	320	6.9L	30L	3.0L	11	73	10L	w198978
w198979	18	8.6	2.0L	260	1.7	26L	3.0L	8.6	77	10L	w198979
w198980	22	11	2.0L	280	2.1	32L	3.0L	8.5	81	10L	w198980
w198981	24	11	2.0	460	1.2	15	3.0L	7.3	150	10L	w198981
w198982	23	9.9	2.0L	430	1.2	18	3.0L	6.3	120	10L	w198982
w198983	28	12	2.0L	530	1.7	25L	3.0L	20	130	10L	w198983
w198984	31	11	2.0L	270	1.9	28L	3.0L	14	120	10L	w198984
w198985	24	9.4	2.0L	670	1.2	35L	3.0L	38	130	10L	w198985
w198986	18	11	2.0L	220	1.4	14L	3.0L	7.2	75	10L	w198986
w198987	14	8.9	2.0L	710	1.2	18L	3.0L	29	51	10L	w198987
w198988	21	10	2.0L	510	1.1	17L	3.0L	11	110	10L	w198988
w198989	19	8.5	2.0L	350	1.7	25L	3.0L	9.3	89	10L	w198989
w198990	21	8.8	2.0L	580	1.1	33L	3.0L	12	120	10L	w198990
w198991	60	25	N	1,700	4.0	40L	3.0L	16	76	10L	w198991
w198992	15	7.8	2.0L	690	.86	26L	3.0L	16	140	10L	w198992
w198993	60	22	2.0L	540	4.3	26L	3.0L	11	110	10L	w198993
w198995	40	14	2.0L	550	3.0	30L	3.0L	21	150	10L	w198995
w198996	16	6.9	2.0L	200	1.4	14L	3.0L	14	67	10L	w198996
w198997	21	7.3	2.0L	340	1.3	13L	3.0L	8.5	130	10L	w198997
w198998	22	8.5	2.0L	180	1.5	15L	3.0L	35	61	10L	w198998
w199933	33	13	2.0L	280	2.3	34L	3.0L	6.8	150	10L	w199933
w199934	26	12	2.0L	910	1.2	18L	3.0L	4.1	110	10L	w199934
w199935	27	11	2.0L	240	1.7	17L	3.0L	6.9	100	10L	w199935
w199936	25	13	2.0L	210	1.6	16	3.0L	5.3	98	10L	w199936
w199937	33	17	2.0L	1,500	2.4	32	3.0L	7.9	160	10L	w199937
w199939	22	12	6.0	380	2.1	32L	3.0L	3.2	93	10L	w199939
w199940	33	13	2.0L	450	2.6	38L	3.0L	5.1	150	10L	w199940
w199941	24	10	2.0L	200	1.6	16L	3.0L	3.8	71	10L	w199941
w199942	26	10	2.0L	520	.97	24	3.0L	3.4	130	10L	w199942
w199943	22	9.0	2.0L	2,800	1.6	16L	3.0L	5.3	120	10L	w199943
w199944	34	10	2.0L	330	1.6	22L	3.0L	13	180	10L	w199944
w199945	41	18	2.0	1,200	2.3	31L	3.0L	21	170	10L	w199945
w199946	26	12	2.0L	320	1.3	22	3.0L	7.4	140	10L	w199946
w199947	29	14	2.0	310	1.6	40	5.0	11	190	10L	w199947
w199948	24	17	2.0L	730	2.7	27L	3.0L	4.4	120	10L	w199948
w199914	19	8.1	2.0L	1,100	2.0	20L	3.0L	4.0	120	10L	w199914
w199915	22	8.0	2.0	400	3.0L	30L	3.0L	2.0L	120	10L	w199915
w199916	25	10	2.0L	620	1.9	19L	3.0L	2.5	130	10L	w199916
w199917	18	14	N	830	3.0	15L	3.0L	1.5	81	10L	w199917
w199918	26	12	2.0L	280	1.7	17L	3.0L	6.1	130	10L	w199918

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio--continued

Sample number	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)
w198978	24	4.0	150	82
w198979	30	4.3	67	130
w198980	32	6.4	74	82
w198981	34	4.8	45	140
w198982	28	4.5	45	110
w198983	58	6.7	120	330
w198984	26	8.3	100	67
w198985	26	5.9	83	88
w198986	29	4.3	140	75
w198987	23L	3.6	130	79
w198988	22	5.2	94	77
w198989	29	5.1	70	110
w198990	34	5.5	110	110
w198991	44	12	97	54
w198992	55	2.6	240	93
w198993	42	10	150	82
w198995	29	6.9	100	91
w198996	31	5.1	120	51
w198997	28	4.7	150	66
w198998	28	6.5	81	73
w199933	82	9.1	580	160
w199934	40	5.3	180	84
w199935	31	6.3	110	62
w199936	33	4.7	180	70
w199937	41	6.3	200	64
w199939	44	5.3	470	72
w199940	60	9.0	290	88
w199941	25	6.0	96	51
w199942	29	4.9	160	77
w199943	47	6.9	190	170
w199944	53	7.6	130	130
w199945	31	6.9	280	120
w199946	34	4.8	60	89
w199947	46	5.9	110	78
w199948	96	7.1	980	210
w199914	67	8.1	180	190
w199915	64	7.0	130	130
w199916	49	5.1	63	120
w199917	98	7.5	420	130
w199918	61	5.5	74	170

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio--continued

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w199919	9.5	32	22	3.0	0.41	0.28	1.3	28	0.92	0.02	w199919
w199920	12.3	40	21	3.2	.51	.33	1.5	28	1.4	.01	w199920
w199921	21.1	51	24	.64	.90	.45	2.3	16	1.3	.02	w199921
w199922	12.0	31	19	2.2	.45	.34	1.5	41	.99	.05	w199922
w199923	8.3	30	19	2.3	.46	.33	1.4	43	.82	.02	w199923
w199924	45.8	54	29	.37	1.2	.71	4.0	6.1	1.0	.04	w199924
w199926	11.3	23	11	4.1	.30	.24	.61	54	.51	.00	w199926
w199927	15.2	37	25	.82	.63	.53	1.9	31	.76	.01	w199927
w199928	16.8	52	26	1.5	.88	.48	2.4	11	1.3	.01	w199928
w199929	32.2	50	23	.46	.73	.38	2.4	18	1.3	.01	w199929
w199930	11.0	31	14	1.7	.28	.37	.42	47	.72	.00	w199930
w199931	45.2	60	20	.66	1.1	.60	2.8	9.3	1.1	.02	w199931
w199741	12.9	47	19	1.9	.40	.42	1.2	28	1.1	.01	w199741
w199742	9.1	27	16	3.2	.45	.44	1.6	47	.75	.01	w199742
w199743	9.3	40	17	1.6	.48	.44	.87	34	1.6	.01	w199743
w199744	26.8	61	17	.39	.58	.25	1.4	15	2.1	.01	w199744
w200975	22.4	42	26	.75	.83	.42	2.0	24	1.3	.03	w200975
w200976	11.5	30	13	1.2	.43	.35	.96	47	1.0	.00	w200976
w200977	5.9	30	25	6.5	.51	.69	.55	26	.64	.00	w200977
w200978	10.1	49	34	.71	.73	.40	1.9	5.7	1.1	.01	w200978
w200979	10.0	25	18	1.2	.38	.27	.85	51	.58	.00	w200979
w200980	9.2	29	19	2.4	.46	.44	1.3	41	.88	.00	w200980
w200981	8.0	31	22	2.7	.60	.51	1.0	35	.76	.01	w200981
w200982	9.9	53	29	1.4	.76	.41	2.7	6.9	1.2	.07	w200982
w200983	9.9	36	19	1.5	.46	.27	1.3	37	1.2	.01	w200983
w200984	5.3	24	19	8.2	.45	.51	.30	36	.69	.09	w200984
w200986	14.3	50	15	1.3	.23	.28	.54	27	1.9	.00	w200986
w200987	42.9	50	23	.35	.93	.50	2.3	16	1.3		w200987
w200988	11.9	39	23	1.8	.61	.34	1.8	26	.96	.04	w200988
w200989	13.8	41	23	3.8	.73	.49	1.4	16	.96		w200989
w201713	11.6	47	30	1.1	.45	.35	1.5	14	1.4	.03	w201713
w201714	16.3	46	15	3.1	.83	.58	2.0	24	.81	.10	w201714
w201715	21.0	44	21	.64	.98	.39	2.6	24	.83	.01	w201715
w201716	14.8	37	18	5.4	.50	.27	1.5	25	.93	.03	w201716
w201717	9.2	36	24	2.5	.66	.29	1.5	26	.90	.00	w201717
w201718	10.9	14	11	2.1	.25	.12	.20	63	.20	.02	w201718
w201719	14.3	42	34	1.0	.35	.28	.87	14	2.2	.01	w201719
w201720	11.2	27	14	3.2	.53	.19	1.1	45	.63	.03	w201720
w201721	9.9	25	14	3.7	.40	.27	.78	46	.54	.08	w201721
w201580	44.2	49	33	.21	1.1	.61	4.5	6.2	1.3	B	w201580

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio--continued

Sample number	SO3 (percent)	Ag-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w199919	5.9	0.30	1,000G	1,000G	15	1.4	120	32	110	5.3	w199919
w199920	2.4	.20	320	290	11	.31	110	25	130	4.9	w199920
w199921	1.2	.20	250	290	13	.40	100	35	120	9.5	w199921
w199922	2.4	.20	370	400	22	.60	120	28	110	5.8	w199922
w199923	2.6	.30	1,000G	310	31	1.4	130	33	130	6.0	w199923
w199924	.78	.20	120	270	5.0	.78	130	33	120	10	w199924
w199926	4.0	.30	390	280	13	1.2	62	19	77	3.5	w199926
w199927	1.5	.20	290	180	24	1.4	180	210	210	7.9	w199927
w199928	1.9	.10L	370	350	14	.54	120	24	140	9.5	w199928
w199929	1.1	.20	160	460	6.0	.25	110	15	100	8.7	w199929
w199930	2.6	.40	1,000G	1,200	14	2.5	100	34	110	1.8	w199930
w199931	1.4	.10	150	1,100	9.0	.19	84	6.9	95	13	w199931
w199741	1.8	.80	320	390	19	.30	210	74	140	4.7	w199741
w199742	3.1	.40	1,000G	2,300	47	.67	88	37	110	6.6	w199742
w199743	1.9	.80	380	520	11	.62	120	37	150	2.2	w199743
w199744	.65	.40	110	530	16	.38	140	25	130	3.7	w199744
w200975	1.4	.30	230	1,600	13	.66	120	35	120	5.8	w200975
w200976	1.7	.30	400	160	30	.72	100	56	98	3.5	w200976
w200977	6.7	.30	1,200	290	28	1.5	140	66	140	5.1	w200977
w200978	.85	.60	680	370	59	1.0	340	67	250	9.9	w200978
w200979	1.8	.40	700	310	37	1.4	90	32	110	4.0	w200979
w200980	2.8	.40	700	1,600	15	.53	110	29	110	6.5	w200980
w200981	3.4	4.0	700	110	31	1.5	100	38	120	3.8	w200981
w200982	.98	.40	640	680	23	.56	180	84	150	8.1	w200982
w200983	1.8	.60	390	220	14	.68	91	58	100	4.0	w200983
w200984	8.7	.50	1,500	120	43	.68	150	34	150	1.9	w200984
w200986	1.3	1.0	400	84	10	.36	130	38	92	2.1	w200986
w200987	1.0	.10L	140	430	6.0	.22	84	16	110	8.2	w200987
w200988	1.5	.70	350	420	18	.20	160	59	130	7.6	w200988
w200989	3.0	.30	380	370	12	.56	87	25	120	6.5	w200989
w201713	1.3	.70	380	430	20	1.0	160	32	210	5.2	w201713
w201714	3.0	.10L	290	390	12	.64	80	29	160	8.6	w201714
w201715	1.3	.20	180	280	6.0	1.5	90	31	120	7.1	w201715
w201716	5.6	.10	230	1,400	13	3.2	100	45	110	5.4	w201716
w201717	2.7	.20	320	2,000	18	1.3	98	34	130	4.3	w201717
w201718	3.5	.50	280	120	40	6.4	130	310	92	3.7L	w201718
w201719	1.1	.30	210	400	22	6.1	200	23	260	2.1	w201719
w201720	3.3	.30	220	310	13	.90	63	21	98	4.5	w201720
w201721	4.2	.30	460	480	20	.92	110	32	82	3.0	w201721
w201580	.25	.30	140	380	9.0	1.1	180	27	150	14	w201580

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	In-S (ppm)	La (ppm)	Sample number
w199919	100	22L	10L	2.3	35	16	26	4.2	7.0L	74	w199919
w199920	87	22L	10L	1.9	42	15	30	5.7	7.0L	65	w199920
w199921	68	22L	10L	1.8	42	12	12	5.7	7.0L	57	w199921
w199922	87	22L	10L	2.3	43	18	39	5.0	7.0L	67	w199922
w199923	100	22L	10L	2.5	45	20	86	4.8	7.0L	72	w199923
w199924	77	22L	10L	2.1	33	7.0	2.0L	4.6	7.0L	72	w199924
w199926	71	22L	11	2.3	28	20	33	2.7	7.0L	27	w199926
w199927	170	22L	10L	3.4	50	17	20	3.9	7.0L	92	w199927
w199928	92	22L	10L	2.9	47	13	30	6.5	7.0L	65	w199928
w199929	57	22L	10L	1.8	31	12	9.0	7.5	7.0L	59	w199929
w199930	98	33	17	3.5	28	27	39	4.5	7.0L	45	w199930
w199931	43	22L	10L	1.2	25	11	3.0	4.6	7.0L	46	w199931
w199741	110	22L	14	5.0	62	22	50	5.4	7.0L	93	w199741
w199742	100	22L	10L	2.4	44	21	82	3.3	7.0L	44	w199742
w199743	110	22L	10L	2.4	37	21	41	8.6	7.0L	65	w199743
w199744	85	22L	10L	2.2	25	12	5.0	9.7	7.0L	75	w199744
w200975	79	22L	10L	2.4	47	15L	32	6.3	7.0L	58	w200975
w200976	60	22L	10L	1.6	43	24	39	5.2	7.0L	52	w200976
w200977	140	22L	10L	3.4	52	22	84	3.4	7.0L	51	w200977
w200978	180	34	13	7.6	69	20	20	5.9	7.0L	170	w200978
w200979	100	22L	10L	2.4	56	15L	110	3.0	7.0L	40	w200979
w200980	110	22L	10L	2.1	42	21	45	4.3	7.0L	54	w200980
w200981	100	22L	10L	4.0	80	15L	86	5.0	7.0L	38	w200981
w200982	140	22L	10L	4.5	70	15L	48	6.1	7.0L	100	w200982
w200983	83	22L	10L	2.0	47	15L	36	5.1	7.0L	51	w200983
w200984	150	22L	17	3.4	67	28	170	3.8	7.0L	75	w200984
w200986	100	22L	10L	2.4	48	15L	31	9.8	7.0L	63	w200986
w200987	47	22L	10L	1.2	44	15L	10	5.6	7.0L	49	w200987
w200988	86	22L	10L	2.6	60	15	64	5.0	7.0L	92	w200988
w200989	130	22L	10L	2.5	46	15L	45	4.3	7.0L	43	w200989
w201713	180	22L	10L	3.1	78	15L	22	6.9	7.0L	86	w201713
w201714	76	22L	10L	1.8	36	15L	49	4.9	7.0L	43	w201714
w201715	170	22L	10L	1.8	40	15L	17	4.8	7.0L	52	w201715
w201716	100	22L	10L	2.4	36	23	20	4.7	7.0L	54	w201716
w201717	99	22L	10L	2.8	54	20	48	4.3	7.0L	54	w201717
w201718	43	27	10L	7.2	83	23	110	3.7L	7.0L	55	w201718
w201719	170	22L	10	3.7	68	19	26	9.1	7.0L	110	w201719
w201720	44	22L	10L	1.4	35	15L	52	3.6	7.0L	36	w201720
w201721	59	31	13	2.0	33	20	60	3.0	7.0L	51	w201721
w201580	240	22L	10L	3.2	45	15L	3.0	5.7	7.0L	100	w201580

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Sample number
w199919	200	1	260	23	12	46L	64	38	68L	420L	w199919
w199920	130	.8	170	35	12	72	73	71	68L	410L	w199920
w199921	300	.9	130	17	13	70	86	51	68L	280L	w199921
w199922	160	.8	310	16	11	73	65	120	150L	420L	w199922
w199923	130	1	340	29	11	83	74	79	68L	480L	w199923
w199924	100	.9	210	2.0L	5	61	84	38	68L	220L	w199924
w199926	55	2	180	47	14	46L	50	10L	68L	350L	w199926
w199927	230	1	750	39	7	97	350	99	95	390L	w199927
w199928	530	1	190	6.0	22	78	51	26	68L	300L	w199928
w199929	320	.9	92	9.0	16	55	38	27	68L	190L	w199929
w199930	81	3	130	77	20	75	74	22	68L	360L	w199930
w199931	84	.9	130	9.0	18	46L	40	22	68L	180L	w199931
w199741	80	2	96	32	17	140	300	210	150L	540L	w199741
w199742	72	2	370	29	10	46L	80	69	68L	660L	w199742
w199743	78	1	150	34	23	62	120	110	150L	650L	w199743
w199744	86	1	98	4.0	17	59	49	63	68L	280L	w199744
w200975	340	1	220	29	8	46L	100	140	68L	310L	w200975
w200976	62	.9	380	38	18	62	100	100	68L	390L	w200976
w200977	200	2	460	29	8	47	120	38	68L	590L	w200977
w200978	290	3	39	24	11	140	170	93	68L	450L	w200978
w200979	150	1	240	45	13	69	110	54	68L	400L	w200979
w200980	160	1	230	17	10	50	51	79	68L	430L	w200980
w200981	170	3	260	24	12	58	110	88	68L	500L	w200981
w200982	160	2	72	42	14	89	310	110	68L	220	w200982
w200983	79	1	210	32	14	53	120	110	68L	400L	w200983
w200984	110	2	630	46	22	100	110	35	68L	570L	w200984
w200986	110	1	130	21	21	65	160	320	68L	280L	w200986
w200987	340	.7	220	21	12	46L	54	85	68L	100	w200987
w200988	110	.8	150	27	10	67	96	93	68L	420L	w200988
w200989	340	1	310	15	11	46L	75	42	68L	290L	w200989
w201713	260	.9	55	21	31	92	83	46	68L	520L	w201713
w201714	51	1	430	63	33	46L	87	14	150L	430L	w201714
w201715	120	1	130	13	4	46L	93	38	68L	290L	w201715
w201716	130	1	300	46	32	46L	110	33	68L	340L	w201716
w201717	330	1	180	17	17	67	80	16	68L	430L	w201717
w201718	80	4	1,400	22	11	52	400	27	68L	370L	w201718
w201719	320	1	69	16	46	93	67	150	68L	350L	w201719
w201720	54	.9	380	7.0L	16	46L	56	20	68L	360L	w201720
w201721	86	2	400	44	33	46L	68	10	68L	400L	w201721
w201580	340	1	47	10	10	97	82	71	68L	210	w201580

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio--continued

Sample number	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	U (ppm)	V-S (ppm)	W-S (ppm)	Sample number
w199919	25	11	2.0L	4,300	2.1	32L	3.0L	2.1	120	10L	w199919
w199920	27	8.9	2.0L	370	1.6	24L	3.0L	4.9	130	10L	w199920
w199921	45	8.5	2.0L	340	1.4	14L	3.0L	5.7	140	10L	w199921
w199922	28	11	4.0	1,200	2.5	25	3.0L	4.2	120	10L	w199922
w199923	29	12	2.0	1,400	2.4	36	3.0L	4.8	180	10L	w199923
w199924	24	10	2.0L	310	1.5	22	3.0L	4.4	130	10L	w199924
w199926	16	9.7	N	310	2.7	27L	3.0L	2.7	80	10L	w199926
w199927	27	17	2.0L	260	2.6	33	3.0L	11	240	10L	w199927
w199928	36	13	2.0L	360	3.0	18L	3.0L	9.5	190	10L	w199928
w199929	22	9.3	2.0L	200	1.6	22	3.0L	5.0	110	10L	w199929
w199930	22	15	2.0L	1,100	4.5	27	3.0L	4.5	120	10L	w199930
w199931	19	6.6	2.0L	270	1.1	20	3.0L	14	110	10L	w199931
w199741	43	25	3.0	250	3.1	31	3.0L	5.4	220	10L	w199741
w199742	22	11	4.0	410	2.2	33L	3.0L	1.1	97	10L	w199742
w199743	25	12	2.0L	300	2.2	32L	3.0L	19	120	10L	w199743
w199744	23	11	2.0L	210	1.9	26	3.0L	6.7	68	10L	w199744
w200975	27	12	2.0L	400	2.2	22L	3.0L	17	130	10L	w200975
w200976	21	9.6	N	310	1.7	52L	3.0L	66	94	10L	w200976
w200977	34	17	2.0L	450	1.7	51L	3.0L	32	170	10L	w200977
w200978	50	36	4.0	570	5.0	50	7.0	13	420	10L	w200978
w200979	29	11	N	360	2.0	40L	3.0L	18	170	10L	w200979
w200980	24	8.7	2.0L	420	1.1	33L	3.0L	6.5	77	10	w200980
w200981	40	16	7.0	310	3.8	38L	3.0L	20	84	10L	w200981
w200982	33	21	4.0	1,300	3.0	30L	3.0L	8.1	200	10L	w200982
w200983	19	8.1	2.0L	310	2.0	30	47	5.1	73	10L	w200983
w200984	30	17	2.0L	1,000	3.8	57L	3.0L	7.5	170	10L	w200984
w200986	19	13	4.0	260	2.1	21L	3.0L	7.7	86	10L	w200986
w200987	21	7.0	2.0L	170	.93	14L	3.0L	21	97	10L	w200987
w200988	26	13	2.0L	820	1.7	34L	30	5.0	100	10L	w200988
w200989	29	11	2.0L	350	2.2	29L	3.0L	14	190	10L	w200989
w201713	50	14	2.0L	950	1.7	26L	3.0L	12	320	10L	w201713
w201714	23	9.8	2.0L	610	1.8	25L	3.0L	13	210	10L	w201714
w201715	25	7.6	2.0L	260	.95	24	3.0L	6.7	130	10L	w201715
w201716	26	10	2.0L	900	1.4	20L	3.0L	8.1	150	10L	w201716
w201717	35	11	2.0L	620	2.2	33L	3.0L	8.7	150	10L	w201717
w201718	40	27	N	1,000	5.5	28L	3.0L	7.3	78	10L	w201718
w201719	55	17	2.0L	390	2.8	49	3.0L	16	260	10L	w201719
w201720	19	6.3	N	690	1.8L	27L	3.0L	4.5	110	10L	w201720
w201721	19	9.1	N	720	3.0	30L	3.0L	7.1	110	10L	w201721
w201580	33	17	3.0	240	1.8	25	5.0	13	260	10L	w201580

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio--continued

Sample number	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)
w199919	56	6.3	210	130
w199920	40	5.7	110	97
w199921	47	6.2	110	140
w199922	56	8.3	140	87
w199923	76	9.6	240	110
w199924	28	4.6	240	60
w199926	110L	11	200	140
w199927	68	9.2	240	72
w199928	77	7.7	140	230
w199929	43	5.0	85	170
w199930	160	21	1,000	240
w199931	41	4.2	49	180
w199741	95	9.3	130	170
w199742	88	8.8	150	120
w199743	54	6.5	150	120
w199744	44	6.7	110	160
w200975	39	7.6	260	93
w200976	53	7.8	190	190
w200977	80	10	570	94
w200978	100	19	300	93
w200979	82	7.0	400	150
w200980	39	6.5	180	86
w200981	85	18	700	130
w200982	67	12	310	140
w200983	36	6.1	420	110
w200984	150	9.4	380	220
w200986	35	7.7	270	190
w200987	13	4.2	81	67
w200988	35	5.9	84	110
w200989	56	8.0	280	88
w201713	85	6.9	110	340
w201714	77	5.5	150	530
w201715	24	5.2	290	69
w201716	90	6.1	620	300
w201717	93	8.7	170	150
w201718	140	21	1,900	47
w201719	100	9.8	74	520
w201720	43	3.6	91	160
w201721	130	14	200	280
w201580	56	6.6	180	94

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio--continued

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w201581	14.2	30	12	6.6	0.25	N	1.2	30	0.63	B	w201581
w201582	21.0	40	19	1.1	.91	.45	2.3	27	.97	B	w201582
w201583	26.2	42	21	.94	.63	.45	2.0	26	.89	B	w201583
w201584	20.1	47	19	2.4	1.1	.54	2.2	21	1.0	B	w201584
w201585	9.5	36	19	2.1	.43	.28	1.3	34	1.0	B	w201585
w201586	11.4	32	22	6.1	.71	.47	1.3	20	.78	B	w201586
w201587	14.1	70	7.7	1.7	.11	.28	.25	16	.23	B	w201587
w201589	10.8	31	19	3.0	N	.25	.35	38	1.1	B	w201589
w201590	8.3	33	22	4.0	.46	.32	.84	30	.65	B	w201590
w201592	11.5	37	20	.98	.46	N	1.6	32	1.2	B	w201592
w201593	21.1	53	24	.85	1.0	.45	2.9	11	1.3	B	w201593
w201594	13.0	37	18	3.4	.43	.31	1.1	30	.78	B	w201594
w201595	20.1	46	21	.83	.88	.27	2.5	21	1.2	B	w201595
w201596	10.1	51	19	2.6	N	N	1.1	18	1.1	B	w201596
w201597	42.4	62	21	.71	1.1	.64	3.0	5.3	1.1	B	w201597
w201598	9.1	37	21	1.6	.41	.30	1.3	32	.90	B	w201598
w201599	13.6	57	18	1.9	1.8	.79	2.4	11	1.1	B	w201599
w201600	23.7	47	16	5.7	.98	.68	2.3	16	.80	B	w201600
w201601	24.2	45	14	6.2	.23	1.1	2.7	13	.77	B	w201601
w201602	12.8	43	20	3.0	.35	N	.80	24	.94	B	w201602
w201603	45.9	57	20	.84	1.0	.59	2.8	11	1.1	B	w201603

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio--continued

Sample number	SO3 (percent)	Ag-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w201581	12	0.10L	350	250	9.0	0.72	99	23	100	8.5	w201581
w201582	1.8	.30	220	260	9.0	.61	90	26	110	7.1	w201582
w201583	1.2	.20	130	220	16	1.0	130	98	120	8.4	w201583
w201584	2.6	.10L	320	230	12	1.0	100	22	110	9.0	w201584
w201585	1.9	.20	500	990	44	.90	95	45	110	4.2	w201585
w201586	4.7	.20	500	780	20	.76	96	32	120	5.3	w201586
w201587	1.1	.30	360	250	14	.80	28	16	49	.7	w201587
w201589	2.4	.30	370	140	19	.55	110	24	97	1.9L	w201589
w201590	2.9	.30	750	180	14	1.5	120	46	140	3.6	w201590
w201592	1.0	.10	340	540	40	.70	110	43	130	7.0	w201592
w201593	1.1	.20	300	430	14	.45	100	16	130	11	w201593
w201594	2.5	.30	380	110	15	.83	140	32	110	7.7	w201594
w201595	1.3	.30	270	250	14	.42	55	15	61	5.0	w201595
w201596	.20	.40	500	270	11	.93	120	28	99	4.0	w201596
w201597	.68	.20	150	560	6.0	1.5	87	11	110	12	w201597
w201598	1.7	.50	500	210	21	1.4	110	58	160	6.6	w201598
w201599	2.5	.20	500	350	9.0	.57	100	20	160	13	w201599
w201600	5.0	.10L	260	370	10	.55	84	19	110	9.3	w201600
w201601	11	.10L	220	310	4.0	.50	110	21	140	11	w201601
w201602	1.7	.20	500	110	17	.75	100	39	95	3.9	w201602
w201603	1.6	.20	140	210	6.0	1.4	120	22	100	10	w201603

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	In-S (ppm)	La (ppm)	Sample number
w201581	39	22L	10L	2.0	23	15L	27	4.9	7.0L	49	w201581
w201582	74	22L	10L	1.9	31	16	15	4.8	7.0L	48	w201582
w201583	120	22L	10L	3.5	38	16	44	4.2	7.0L	57	w201583
w201584	65	22L	10L	2.4	32	13	49	5.0	7.0L	45	w201584
w201585	85	22L	10L	1.5	45	22	46	5.3	7.0L	63	w201585
w201586	90	22L	10L	3.0	45	22	44	4.4	7.0L	61	w201586
w201587	41	22L	10L	.64	16	15L	42	.7	7.0L	14	w201587
w201589	76	22L	10L	2.4	36	21	27	5.6	7.0L	83	w201589
w201590	130	22L	10L	3.1	39	15L	7.0	3.6	7.0L	72	w201590
w201592	83	22L	10L	2.3	40	19	18	6.1	7.0L	61	w201592
w201593	67	22L	10L	2.1	39	15L	13	6.2	7.0L	57	w201593
w201594	78	22L	10L	3.2	37	17	65	4.6	7.0L	62	w201594
w201595	78	22L	10L	1.1	36	15	20	3.0	7.0L	30	w201595
w201596	90	22L	10L	2.5	32	16	78	6.9	7.0L	69	w201596
w201597	54	22L	10L	1.4	28	15L	6.0	5.7	7.0L	50	w201597
w201598	150	22L	10L	2.6	49	21	46	4.4	7.0L	55	w201598
w201599	52	22L	10L	2.4	38	15L	38	5.9	7.0L	51	w201599
w201600	59	22L	10L	1.6	28	15	31	4.6	7.0L	46	w201600
w201601	52	22L	10L	2.3	20	15L	17	5.4	7.0L	54	w201601
w201602	76	22L	10L	2.9	28	16	36	4.7	7.0L	47	w201602
w201603	43	22L	10L	1.7	21	15L	8.0	5.2	7.0L	65	w201603

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Sample number
w201581	70	1	1,100	13	12	46L	42	20	68L	280L	w201581
w201582	370	1	160	19	15	47	46	49	150L	290L	w201582
w201583	160	2	360	33	9	66	160	110	150L	100	w201583
w201584	120	1	180	15	12	51	94	51	68L	250L	w201584
w201585	98	1	380	41	25	72	94	65	68L	420L	w201585
w201586	350	2	260	17	16	55	81	30	150L	310L	w201586
w201587	47	.7	150	27	9	46L	110	25	68L	210L	w201587
w201589	200	.9	140	7.0L	20	64	62	74	68L	280L	w201589
w201590	260	1	230	27	15	80	79	40	68L	360L	w201590
w201592	100	.9	260	19	13	47	79	62	68L	87	w201592
w201593	540	.9	120	8.0	13	50	44	67	68L	130	w201593
w201594	140	2	320	35	13	63	90	62	150L	310L	w201594
w201595	360	.5	160	14	19	58	86	41	68L	200L	w201595
w201596	110	2	150	15	25	73	91	36	150L	300L	w201596
w201597	110	.7	110	14	15	49	41	32	68L	140	w201597
w201598	140	2	200	47	17	78	140	110	68L	330L	w201598
w201599	83	1	140	23	24	69	62	36	68L	290L	w201599
w201600	71	.8	650	26	11	46L	60	33	68L	160	w201600
w201601	54	1	740	11	7	46L	40	15	68L	150	w201601
w201602	140	2	180	24	13	65	110	30	68L	230L	w201602
w201603	110	.7	160	14	14	77	81	32	68L	150	w201603

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio--continued

Sample number	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	U (ppm)	V-S (ppm)	W-S (ppm)	Sample number
w201581	23	9.2	2.0L	690	2.1	21L	3.0L	4.9	71	10L	w201581
w201582	23	9.0	2.0L	270	.95	29	3.0L	15	99	10L	w201582
w201583	24	18	2.0L	250	2.3	31	43	12	140	10L	w201583
w201584	25	11	2.0L	240	2.5	30	3.0L	20	100	10L	w201584
w201585	26	9.5	2.0L	420	1.1	32L	3.0L	6.3	130	10L	w201585
w201586	32	12	2.0L	530	2.6	26L	3.0L	8.8	180	10L	w201586
w201587	8.5	2.8	2.0L	210	.71	21L	3.0L	9.2	55	10L	w201587
w201589	27	11	2.0L	1,200	1.9	28L	67	6.5	110	10L	w201589
w201590	29	13	2.0L	640	2.4	36L	3.0L	6.0	130	10L	w201590
w201592	25	10	2.0L	330	1.7	26L	3.0L	6.1	98	10L	w201592
w201593	27	9.5	2.0L	280	.95	24	3.0L	12	140	10L	w201593
w201594	25	16	2.0L	230	2.3	23L	3.0L	18	110	10L	w201594
w201595	12	6.0	2.0L	300	1.0	25	3.0L	9.0	120	10L	w201595
w201596	20	13	2.0L	620	2.0	30L	3.0L	5.0	120	10L	w201596
w201597	20	7.5	2.0L	250	1.4	14L	3.0L	21	140	10L	w201597
w201598	33	13	2.0L	340	3.3	33L	51	12	160	10L	w201598
w201599	21	13	2.0L	650	1.5	29L	3.0L	35	200	10L	w201599
w201600	19	7.6	2.0L	510	1.3	17	3.0L	7.6	140	10L	w201600
w201601	24	12	2.0L	610	2.1	37	3.0L	23	120	10L	w201601
w201602	21	13	2.0L	250	2.3	B	3.0L	B	87	10L	w201602
w201603	18	10	2.0L	190	.87	6.5L	3.0L	2.2	110	10L	w201603

Table 6f.--Major and minor oxide and trace element compostion of the laboratory ash of 101 bituminous coal samples from Ohio--continued

Sample number	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)
w201581	40	5.6	75	220
w201582	35	4.8	97	110
w201583	65	8.0	340	90
w201584	55	8.0	190	120
w201585	100	8.4	410	220
w201586	110	8.8	200	180
w201587	38	4.3	67	60
w201589	80	6.5	65	230
w201590	82	6.0	330	170
w201592	68	7.8	170	170
w201593	52	6.2	76	130
w201594	72	9.2	110	140
w201595	59	3.0	60	200
w201596	97	9.9	200	260
w201597	38	3.8	430	160
w201598	88	7.7	300	160
w201599	57	5.9	89	150
w201600	46	4.2	100	130
w201601	44	6.2	120	92
w201602	80	7.8	170	140
w201603	39	4.4	220	160

Table 6g.--Content of 22 trace elements in 101 bituminous coal samples from Ohio.

[Analysis performed on whole-coal. Values in parts-per-million (ppm). L, less than the value shown; B, not determined.]

Sample number	As (ppm)	Ce (ppm)	Cl (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	Sample number
w198978	13	10	B	2.2	11	0.8	0.18	150	0.5	0.030	w198978
w198979	33	10	B	2.2	12	.8	.21	160	.6	.14	w198979
w198980	8.0	10	B	3.2	11	.9	.20	83	.4	.11	w198980
w198981	12	41	B	8.0	46	4.1	.71	220	1.9	.13	w198981
w198982	14	37	B	7.6	45	3.9	.67	170	1.9	.16	w198982
w198983	4.0	16	B	3.2	18	.7	.30	150	.7	.11	w198983
w198984	9.0	13	B	3.9	17	1.1	.26	71	.8	.13	w198984
w198985	4.0	8.0	B	.8	10	.9	.15	150	.5	.10	w198985
w198986	14	24	B	16	21	1.9	.46	110	.9	.11	w198986
w198987	7.0	15	B	2.8	13	1.2	.26	140	.7	.090	w198987
w198988	16	20	B	4.4	20	1.7	.35	110	.9	.090	w198988
w198989	7.0	10	B	2.6	13	.9	.20	71	.6	.090	w198989
w198990	7.0	9.0	B	2.0	10	.8	.18	130	.5	.090	w198990
w198991	6.0	20	B	7.0	17	.7	.41	110	.6	.23	w198991
w198992	4.0	12	B	4.0	5.2	.1	.20	47	.1	.17	w198992
w198993	10	31	B	9.0	19	.8	.53	55	.6	.090	w198993
w198995	2.0	13	B	3.4	23	.7	.30	47	.8	.080	w198995
w198996	17	14	B	5.9	15	1.9	.39	53	.8	.11	w198996
w198997	10	22	B	6.5	30	2.5	.37	110	1.1	.080	w198997
w198998	16	18	B	9.4	18	2.3	.34	140	.9	.21	w198998
w199933	8.0	9.0	960	3.7	13	.4	.27	20L	.4	.11	w199933
w199934	44	21	620	5.5	22	1.3	.43	96	.8	.12	w199934
w199935	9.0	18	650	4.7	24	1.6	.41	64	.9	.18	w199935
w199936	10	25	820	15	27	1.8	.49	35	.9	.24	w199936
w199937	7.0	22	880	4.7	21	.9	.47	84	.7	.060	w199937
w199939	8.0	9.0	930	3.6	11	.7L	.24	20L	.2	.21	w199939
w199940	4.0	9.0	1,000	3.0	12	.5	.22	22	.5	.15	w199940
w199941	83	20	640	7.8	20	1.3	.39	72	1.2	.23	w199941
w199942	36	25	510	8.1	31	1.7	.38	76	1.3	.22	w199942
w199943	5.0	17	650	4.8	22	1.9	.34	84	.9	.33	w199943
w199944	3.0	20	740	3.4	25	2.1	.39	38	1.2	.18	w199944
w199945	3.0	27	880	4.4	25	1.0	.45	55	1.1	.070	w199945
w199946	77	43	1,200	7.9	39	2.7	.71	130	1.5	.46	w199946
w199947	13	35	750	12	41	2.9	.65	140	1.2	.12	w199947
w199948	8.0	12	1,700	8.3	11	.6	.37	130	.5	.12	w199948
w199914	4.0	13	B	3.1	14	1.0	.27	44	.6	.21	w199914
w199915	32	8.0	B	3.6	10	.6	.18	28	.3	.17	w199915
w199916	64	17	B	5.8	20	1.4	.32	96	.8	.25	w199916
w199917	10	26	B	19	16	1.1	.63	22	.8	.75	w199917
w199918	26	23	B	6.2	19	1.2	.46	24	.9	.29	w199918

Table 6g.--Content of 22 trace elements in 101 bituminous coal samples from Ohio--continued

Sample number	La (ppm)	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Sample number
w198978	5	0.1	300	49	44L	0.40	1.9	0.9	0.90	0.7L	w198978
w198979	6	.1	200	25	38L	.40	2.1	1.4	1.0	.2	w198979
w198980	5	.1	200	16	35L	.20	2.1	2.9	1.0	.2	w198980
w198981	23	.2	1,000	220	60	.50	7.8	11	3.7	.4	w198981
w198982	21	.2	1,000	160	54	.60	7.7	11	3.3	.4	w198982
w198983	8	.1	300	68	38L	.20	3.3	5.1	1.4	.2	w198983
w198984	7	.1	200	28	35L	.20	3.3	5.1	1.2	.2	w198984
w198985	5	.1	200	48	31L	.20	2.0	1.0	.80	.1	w198985
w198986	13	.2	310	45	24	.50	3.7	2.2	2.2	.3	w198986
w198987	8	.1	300	15	38L	.20	2.3	3.6	1.5	.2	w198987
w198988	11	.1	300	320	33	.50	3.6	2.1	1.8	.2	w198988
w198989	6	.1	200	15	32L	.30	2.2	3.9	1.0	.2	w198989
w198990	5	.1	200	87	32L	.20	1.9	.8	.80	.1	w198990
w198991	13	.1	200	200	36L	.30	4.5	6.4	1.9	.3	w198991
w198992	6	.1	200	190	34L	.20	1.7	6.8	.90	.1	w198992
w198993	18	.2	200	96	42L	.70	7.0	6.6	2.6	.5	w198993
w198995	6	.1	200	49	30L	.20	4.0	4.2	1.4	.3	w198995
w198996	7	.2	400	47	29	.80	3.4	7.7	1.5	.3	w198996
w198997	11	.2	690	100	54L	.40	4.8	1.7	1.7	.3	w198997
w198998	8	.3	190	B	32	.40	4.5	9.0	1.7	.3	w198998
w199933	4	.1	200	3	45L	.40	2.9	2.6	1.1	.2	w199933
w199934	12	.1	440	83	55L	1.0	4.4	1.9	2.0	.2	w199934
w199935	10	.2	500	9	55L	.20	4.7	3.8	1.9	.3	w199935
w199936	13	.2	610	9	60L	.20	4.8	7.5	2.5	.3	w199936
w199937	11	.1	300	58	50L	.40	4.2	2.3	2.2	.3	w199937
w199939	4	.1	200	4	50L	.30	2.1	3.5	1.1	.2	w199939
w199940	5	.1	200	2	50L	.20	2.6	2.6	1.0	.2	w199940
w199941	11	.2	500	12	60L	1.1	4.4	3.3	1.9	.3	w199941
w199942	15	.2	790	35	70L	1.7	5.3	2.4	2.1	.2	w199942
w199943	10	.2	700	11	70L	.40	4.2	4.5	1.7	.3	w199943
w199944	11	.2	700	10	60L	.40	6.2	3.5	1.9	.3	w199944
w199945	14	.2	400	11	50L	.20	5.4	3.9	2.4	.3	w199945
w199946	24	.2	1,100	42	80L	1.9	8.1	11	3.7	.4	w199946
w199947	19	.2	900	20	44	2.0	7.3	3.0	3.5	.4	w199947
w199948	6	.1	400	4	50L	.50	2.7	3.9	1.9	.3	w199948
w199914	7	.2	500	5	50L	.20	2.9	4.4	1.2	.3	w199914
w199915	4	.1	300	4	45L	1.0	2.2	1.3	.80	.3L	w199915
w199916	10	.2	500	49	55L	1.9	3.9	2.0	1.6	.3	w199916
w199917	13	.2	500	40	55L	.30	3.5	2.8	2.8	.6	w199917
w199918	11	.2	300	7	60L	.70	4.7	5.5	2.1	.3	w199918

Table 6g.--Content of 22 trace elements in 101 bituminous coal samples from Ohio--continued

Sample number	Th (ppm)	U (ppm)	Yb (ppm)
W198978	3.0L	1.1	0.4
W198979	3.0L	1.0	.5
W198980	3.0L	.80	.6
W198981	5.0	2.4	1.6
W198982	6.0	2.1	1.5
W198983	3.0L	2.4	.8
W198984	3.0L	1.5	.9
W198985	3.0L	3.2	.5
W198986	3.0L	1.5	.9
W198987	3.0L	4.9	.6
W198988	3.0L	1.9	.9
W198989	3.0L	1.1	.6
W198990	3.0L	1.1	.5
W198991	3.0L	1.2	.9
W198992	3.0L	1.8	.3
W198993	3.0L	1.3	1.2
W198995	3.0L	2.1	.7
W198996	3.0L	3.0	1.1
W198997	3.0L	2.0	1.1
W198998	3.0L	7.1	1.3
W199933	3.0L	.60	.8
W199934	3.0L	.70	.9
W199935	3.0L	1.2	1.1
W199936	3.0	1.0	.9
W199937	4.0	1.0	.8
W199939	3.0L	.30	.5
W199940	3.0L	.40	.7
W199941	3.0L	.70	1.1
W199942	5.0	.70	1.0
W199943	3.0L	1.0	1.3
W199944	4.0L	2.4	1.4
W199945	4.0L	2.8	.9
W199946	7.0	2.3	1.5
W199947	10	2.9	1.5
W199948	3.0L	.50	.8
W199914	3.0L	.60	1.2
W199915	3.0L	.20L	.7
W199916	3.0L	.40	.8
W199917	3.0L	.30	1.5
W199918	3.0L	1.1	1.0

Table 6g.--Content of 22 trace elements in 101 bituminous coal samples from Ohio--continued

Sample number	As (ppm)	Ce (ppm)	Cl (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	Sample number
w199919	6.0	11	B	3.0	11	0.5	0.22	32	0.4	0.16	w199919
w199920	24	14	B	3.1	15	.6	.23	44	.7	.38	w199920
w199921	43	21	B	7.4	25	2.0	.37	64	1.2	.14	w199921
w199922	33	14	B	3.3	14	.7	.28	38	.6	.18	w199922
w199923	59	11	B	2.7	11	.5	.21	60	.4	.27	w199923
w199924	7.0	61	B	15	53	4.8	.98	220	2.1	.15	w199924
w199926	4.0	7.0	B	2.1	8.7	.4	.26	20L	.3	.19	w199926
w199927	59	27	B	32	31	1.2	.52	20L	.6	.20	w199927
w199928	2.0	20	B	4.1	24	1.6	.48	96	1.1	.10	w199928
w199929	11	36	B	4.8	33	2.8	.57	76	2.4	.32	w199929
w199930	27	11	B	3.7	13	.2	.38	20L	.5	.23	w199930
w199931	13	38	B	3.1	43	6.1	.56	220	2.1	.13	w199931
w199741	57	27	2,100	9.6	18	.6	.64	88	.7	.46	w199741
w199742	32	8.0	1,700	3.4	9.9	.6	.22	620	.3	.17	w199742
w199743	30	11	2,100	3.4	14	.2	.22	1,300	.8	.45	w199743
w199744	34	37	570	6.6	35	1.0	.60	170	2.6	.62	w199744
w200975	19	26	1,100	7.8	27	1.3	.54	160	1.4	.23	w200975
w200976	32	12	1,100	6.4	11	.4	.18	110	.6	.37	w200976
w200977	3.0	8.0	1,700	3.9	8.0	.3	.20	84	.2	.11	w200977
w200978	7.0	34	1,300	6.8	25	1.0	.77	76	.6	.030	w200978
w200979	12	9.0	1,100	3.2	11	.4	.24	44	.3	.17	w200979
w200980	20	10	1,600	2.7	11	.6	.19	64	.4	.11	w200980
w200981	4.0	8.0	2,000	3.0	9.4	.3	.32	56	.4	.050	w200981
w200982	11	18	1,300	8.3	15	.8	.45	110	.6	.030	w200982
w200983	32	9.0	1,300	5.7	9.9	.4	.20	76	.5	.41	w200983
w200984	10	8.0	1,400	1.8	7.7	.1	.18	56	.2	.17	w200984
w200986	18	18	1,300	5.4	13	.3	.35	84	1.4	.30	w200986
w200987	31	36	470	6.8	45	3.5	.52	370	2.4	.29	w200987
w200988	79	19	1,100	7.0	15	.9	.31	100	.6	.26	w200988
w200989	5.0	12	1,100	3.5	17	.9	.34	140	.6	.16	w200989
w201713	2.0	18	1,400	3.7	24	.6	.36	25	.8	.070	w201713
w201714	13	13	180	4.8	26	1.4	.30	120	.8	.10	w201714
w201715	22	19	180	6.5	25	1.5	.38	50	1.0	.080	w201715
w201716	88	15	740	6.6	17	.8	.35	20	.7	.25	w201716
w201717	7.0	9.0	850	3.1	12	.4	.26	20L	.4	.11	w201717
w201718	29	14	950	34	10	.4L	.78	20L	.4L	.27	w201718
w201719	9.0	29	940	3.3	37	.3	.53	25	1.3	.18	w201719
w201720	5.0	7.0	210	2.4	11	.5	.16	20L	.4	.070	w201720
w201721	7.0	11	1,300	3.2	8.1	.3	.20	66	.3	.12	w201721
w201580	34	81	700	12	67	6.4	1.4	340	2.5	.23	w201580

Table 6g.--Content of 22 trace elements in 101 bituminous coal samples from Ohio--continued

Sample number	La (ppm)	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Sample number
w199919	7	0.1	200	7	40L	0.30	2.4	3.2	1.0	0.2	w199919
w199920	8	.1	300	6	50L	1.3	3.3	5.0	1.1	.2	w199920
w199921	12	.2	700	14	60L	1.6	9.4	1.7	1.8	.3	w199921
w199922	8	.1	300	26	50L	1.1	3.3	1.6	1.3	.3	w199922
w199923	6	.1	200	7	40L	1.2	2.4	1.0	1.0	.2	w199923
w199924	33	.4	2,400	82	100L	.50	11	19	4.8	.7	w199924
w199926	3	.2	200	1	40L	.20	1.8	1.8	1.1	.3	w199926
w199927	14	.2	600	8	60L	1.5	4.1	9.7	2.6	.4	w199927
w199928	11	.2	600	6	50L	.30	6.1	3.5	2.1	.5	w199928
w199929	19	.3	910	18	60L	.40	7.1	13	3.0	.5	w199929
w199930	5	.3	300	2	40L	.40	2.4	5.5	1.6	.5	w199930
w199931	21	.4	2,000	36	80L	.40	8.6	9.6	3.0	.5	w199931
w199741	12	.2	400	6	70L	1.7	5.5	5.5	3.2	.4	w199741
w199742	4	.2	300	2	60L	.50	2.0	1.0	1.0	.2	w199742
w199743	6	.1	300	3	60L	1.5	2.3	6.9	1.1	.2	w199743
w199744	20	.3	500	15	75L	.80	6.2	20	3.0	.5	w199744
w200975	13	.3	700	28	70L	1.4	6.0	7.7	2.7	.5	w200975
w200976	6	.1	300	1	45L	.60	2.4	2.7	1.1	.2	w200976
w200977	3	.1	300	1	35L	.20	2.0	2.1	1.0	.1	w200977
w200978	17	.3	300	6	45L	1.7	5.0	1.5	3.6	.5	w200978
w200979	4	.1	200	1	40L	.20	2.9	2.3	1.1	.2	w200979
w200980	5	.1	300	2	40L	.40	2.2	1.5	.80	.1	w200980
w200981	3	.2	300	2	40L	.20	3.2	1.7	1.3	.3	w200981
w200982	10	.2	300	28	22	2.1	3.3	1.1	2.1	.3	w200982
w200983	5	.1	200	3	40L	1.4	1.9	3.2	.80	.2	w200983
w200984	4	.1	200	21	30L	.20	1.6	2.8	.90	.2	w200984
w200986	9	.2	300	1	40L	1.1	2.7	6.2	1.9	.3	w200986
w200987	21	.3	1,600		43	1.3	9.0	11	3.0	.4	w200987
w200988	11	.1	300	23	50L	1.7	3.1	1.6	1.6	.2	w200988
w200989	6	.2	500		40L	.30	4.0	3.8	1.5	.3	w200989
w201713	10	.1	300	14	60L	.60	5.8	4.6	1.6	.2	w201713
w201714	7	.2	700	74	70L	.70	3.8	1.7	1.6	.3	w201714
w201715	11	.2	610	7	60L	.60	5.2	2.3	1.6	.2	w201715
w201716	8	.2	300	21	50L	2.1	3.8	2.3	1.5	.2	w201716
w201717	5	.1	200	2	40L	.20	3.2	3.2	1.0	.2	w201717
w201718	6	.4	97	10	40L	.60	4.4	2.0L	2.9	.6	w201718
w201719	16	.2	300	6	50L	.60	7.9	19	2.5	.4	w201719
w201720	4	.1	160	14	40L	.20	2.1	.8	.70	.2L	w201720
w201721	5	.2	200	33	40L	.20	1.9	1.6	.90	.3	w201721
w201580	46	.5	2,000	B	94	2.6	15	12	7.5	.8	w201580

Table 6g.--Content of 22 trace elements in 101 bituminous coal samples from Ohio--continued

Sample number	Th (ppm)	U (ppm)	Yb (ppm)
w199919	3.0L	0.20	0.6
w199920	3.0L	.60	.7
w199921	3.0L	1.2	1.3
w199922	3.0	.50	1.0
w199923	3.0	.40	.8
w199924	10	2.0	2.1
w199926	3.0L	.30	1.2
w199927	5.0	1.6	1.4
w199928	3.0L	1.6	1.3
w199929	7.0	1.6	1.6
w199930	3.0	.50	2.3
w199931	9.0	6.5	1.9
w199741	4.0	.70	1.2
w199742	3.0L	.10	.8
w199743	3.0L	1.8	.6
w199744	7.0	1.8	1.8
w200975	5.0L	3.7	1.7
w200976	6.0L	7.6	.9
w200977	3.0L	1.9	.6
w200978	5.0	1.3	1.9
w200979	4.0L	1.8	.7
w200980	3.0L	.60	.6
w200981	3.0L	1.6	1.4
w200982	3.0L	.80	1.2
w200983	3.0	.50	.6
w200984	3.0L	.40	.5
w200986	3.0L	1.1	1.1
w200987	6.0L	9.1	1.8
w200988	4.0L	.60	.7
w200989	4.0L	1.9	1.1
w201713	3.0L	1.4	.8
w201714	4.0L	2.1	.9
w201715	5.0	1.4	1.1
w201716	3.0L	1.2	.9
w201717	3.0L	.80	.8
w201718	3.0L	.80	2.3
w201719	7.0	2.3	1.4
w201720	3.0L	.50	.4
w201721	3.0L	.70	1.4
w201580	11	5.6	2.9

Table 6g.--Content of 22 trace elements in 101 bituminous coal samples from Ohio--continued

Sample number	As (ppm)	Ce (ppm)	Cl (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	Sample number
w201581	4.0	14	300	3.2	15	1.2	0.28	350	0.7	0.21	w201581
w201582	21	19	800	5.4	23	1.5	.39	140	1.0	.74	w201582
w201583	130	35	600	26	32	2.2	.92	160	1.1	1.1	w201583
w201584	13	20	1,100	4.4	22	1.8	.49	140	1.0	.27	w201584
w201585	29	9.0	1,100	4.3	11	.4	.14	56	.5	.23	w201585
w201586	2.0	11	1,000	3.7	14	.6	.34	52	.5	.22	w201586
w201587	12	4.0	1,400	2.2	6.9	.1	.09	34	.1	.12	w201587
w201589	51	12	900	2.6	11	.2L	.26	33	.6	.86	w201589
w201590	4.0	10	1,300	3.8	11	.3	.26	50	.3	.29	w201590
w201592	30	13	B	5.0	15	.8	.27	56	.7	.46	w201592
w201593	18	21	800	3.4	28	2.4	.45	96	1.3	.31	w201593
w201594	9.0	18	1,300	4.2	14	1.0	.42	36	.6	.36	w201594
w201595	6.0	11	550	3.0	12	1.0	.22	96	.6	.42	w201595
w201596	6.0	12	B	2.8	10	.4	.25	38	.7	.20	w201596
w201597	5.0	37	300	4.5	48	5.1	.60	230	2.4	.26	w201597
w201598	36	10	1,000	5.3	14	.6	.24	50	.4	.46	w201598
w201599	7.0	14	220	2.7	22	1.7	.33	190	.8	.14	w201599
w201600	17	20	200	4.5	27	2.2	.39	240	1.1	.11	w201600
w201601	5.0	26	200	5.1	34	2.6	.55	430	1.3	.10	w201601
w201602	21	13	B	5.0	12	.5	.37	63	.6	.46	w201602
w201603	21	55	300	9.9	47	4.7	.77	260	2.4	.52	w201603

Table 6g.--Content of 22 trace elements in 101 bituminous coal samples from Ohio--continued

Sample number	La (ppm)	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Sample number
w201581	7	0.2	N	B	40L	0.30	3.3	2.5	1.3	0.3	w201581
w201582	10	.2	700	B	60L	.80	4.8	5.6	1.9	.2	w201582
w201583	15	.4	870	B	27	4.8	6.4	3.4	4.7	.6	w201583
w201584	9	.3	800	B	50L	2.3	5.0	4.7	2.3	.5	w201584
w201585	6	.1	200	B	40L	1.3	2.5	2.0	.90	.1	w201585
w201586	7	.2	400	B	35L	.50	3.6	4.2	1.4	.3	w201586
w201587	2	.1	290	B	30L	.50	1.2	1.1	.40	.1	w201587
w201589	9	.1	200	B	30L	2.1	2.9	9.9	1.2	.2	w201589
w201590	6	.1	200	B	30L	2.0	2.4	4.9	1.1	.2	w201590
w201592	7	.1	N	B	10	1.1	2.9	2.2	1.2	.2	w201592
w201593	12	.2	700	B	27	.60	5.7	6.2	2.0	.2	w201593
w201594	8	.2	300	B	40L	.40	3.3	7.9	2.1	.3	w201594
w201595	6	.1	400	B	40L	.40	2.5	1.2	1.2	.2	w201595
w201596	7	.2	N	B	30L	.30	2.0	5.3	1.3	.2	w201596
w201597	21	.3	2,000	B	59	.50	8.5	14	3.2	.6	w201597
w201598	5	.2	200	B	30L	1.8	3.0	2.9	1.2	.3	w201598
w201599	7	.2	800	B	40L	.40	2.9	2.9	1.8	.2	w201599
w201600	11	.2	1,200	B	37	.50	4.5	1.7	1.8	.3	w201600
w201601	13	.3	1,900	B	36	.60	5.7	1.9	2.9	.5	w201601
w201602	6	.2	N	B	30L	.40	2.7	3.5	1.6	.3	w201602
w201603	30	.3	2,000	B	69	1.1	8.4	13	4.6	.4	w201603

Table 6g.--Content of 22 trace elements in 101 bituminous coal samples from Ohio--continued

Sample number	Th (ppm)	U (ppm)	Yb (ppm)
w201581	3.0L	0.70	0.8
w201582	6.0	3.2	1.0
w201583	8.0	3.2	2.1
w201584	6.0	4.1	1.6
w201585	3.0L	.60	.8
w201586	3.0L	1.0	1.0
w201587	3.0L	1.3	.6
w201589	3.0L	.70	.7
w201590	3.0L	.50	.5
w201592	3.0L	.70	.9
w201593	5.0	2.5	1.3
w201594	3.0L	2.4	1.2
w201595	5.0	1.8	.6
w201596	3.0L	.50	1.0
w201597	6.0L	8.8	1.6
w201598	3.0L	1.1	.7
w201599	4.0L	4.7	.8
w201600	4.0	1.8	1.0
w201601	9.0	5.6	1.5
w201602	B	B	1.0
w201603	3.0L	1.0	2.0

Table 6h.--Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis.

[Values in percent or parts-per-million. 22 values are from direct determinations on whole-coal; all other values calculated from analyses of ash. S means analysis by emission spectography; L, less than the value shown; N, not detected; B, not determined.]

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w198978	2.0	0.91	0.18	0.043	0.030	0.16	2.0	0.050	0.02	13	w198978
w198979	2.7	1.2	.066	.037	.020	.15	2.2	.067	.02	33	w198979
w198980	1.8	1.1	.047	.030	.020	.13	1.9	.051	.02	8.0	w198980
w198981	8.8	4.5	.18	.22	.10	.69	2.1	.24	.03L	12	w198981
w198982	8.5	4.6	.17	.22	.10	.66	2.6	.24	.03	14	w198982
w198983	2.5	1.5	.12	.054	.030	.16	1.7	.086	.01L	4.0	w198983
w198984	2.5	1.4	.063	.043	.020	.16	1.5	.078	.02	9.0	w198984
w198985	1.9	.94	.14	.071	.020	.15	1.0	.056	.01L	4.0	w198985
w198986	4.6	2.3	.11	.11	.031	.45	3.3	.11	.04	14	w198986
w198987	3.3	1.3	.92	.30	.030	.27	2.2	.075	.02L	7.0	w198987
w198988	4.1	2.2	.11	.097	.030	.41	1.8	.11	.03	16	w198988
w198989	2.5	1.3	.070	.041	.020	.16	2.2	.078	.02	7.0	w198989
w198990	1.9	1.1	.078	.036	.020	.14	1.7	.060	.01L	7.0	w198990
w198991	.74	.60	.14	.017	.020	.023	2.8	.018	.03	6.0	w198991
w198992	2.0	1.4	.11	.038	.020	.13	2.7	.069	.05	4.0	w198992
w198993	2.0	1.4	.091	.039	.020	.12	2.8	.069	.03	10	w198993
w198995	2.2	1.4	.12	.037	.020	.11	1.4	.079	.03	2.0	w198995
w198996	4.3	1.7	.14	.12	.040	.43	5.0	.098	.04	17	w198996
w198997	5.6	2.5	.11	.17	.069	.53	3.1	.12	.02L	10	w198997
w198998	4.0	1.8	.10	.11	.019	.40	4.4	.11	.02L	16	w198998
w199933	1.3	.98	.11	.020	.020	.073	2.2	.046	.04	8.0	w199933
w199934	3.2	1.9	.43	.072	.044	.26	2.6	.097	.02L	44	w199934
w199935	3.8	2.2	.098	.090	.050	.36	2.1	.13	.03	9.0	w199935
w199936	3.5	2.1	.15	.061	.061	.27	3.9	.10	.06	10	w199936
w199937	2.8	1.8	.27	.071	.030	.26	.97	.098	.06	7.0	w199937
w199939	1.0	.75	.16	.017	.020	.025	3.5	.021	.05	8.0	w199939
w199940	1.3	.99	.13	.027	.020	.11	1.4	.056	.02	4.0	w199940
w199941	3.8	1.9	.056	.061	.050	.27	3.5	.098	.04	83	w199941
w199942	4.7	2.5	.14	.10	.079	.41	2.3	.15	.02L	36	w199942
w199943	3.6	1.9	.21	.080	.070	.34	3.4	.11	.06	5.0	w199943
w199944	4.4	2.4	.24	.11	.070	.40	1.2	.14	.02L	3.0	w199944
w199945	3.1	1.7	.12	.044	.040	.21	.89	.13	.05	3.0	w199945
w199946	5.4	3.6	.062	.12	.11	.70	6.3	.21	.09	77	w199946
w199947	5.6	3.6	.56	.14	.090	.63	1.6	.15	.05	13	w199947
w199948	2.2	1.1	.44	.035	.040	.11	1.7	.049	.03	8.0	w199948
w199914	2.8	1.5	.27	.061	.050	.21	2.9	.076	.06	4.0	w199914
w199915	1.2	.85	.29	.025	.030	.11	3.3	.043	.04	32	w199915
w199916	3.3	1.9	.20	.071	.050	.30	2.4	.10	.02L	64	w199916
w199917	2.6	1.6	.16	.028	.050	.13	7.1	.089	.12	10	w199917
w199918	2.8	1.6	.17	.041	.030	.23	5.4	.11	.07	26	w199918

Table 6h.--Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis--continued

Sample number	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Cl (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Sample number
w198978	71	20	1.0	0.06	10	B	2.2	11	0.8	5.8	w198978
w198979	58	21	1.2	.05	10	B	2.2	12	.8	5.3	w198979
w198980	66	19	1.2	.04	10	B	3.2	11	.9	6.0	w198980
w198981	53	110	2.3	.06	41	B	8.0	46	4.1	19	w198981
w198982	60	100	2.3	.07	37	B	7.6	45	3.9	20	w198982
w198983	120	26	2.5	.04	16	B	3.2	18	.7	11	w198983
w198984	54	29	1.3	.06	13	B	3.9	17	1.1	7.7	w198984
w198985	59	31	.9	.03	8.0	B	.8	10	.9	4.2	w198985
w198986	48	41	2.3	.10	24	B	16	21	1.9	9.7	w198986
w198987	54	37	.7	.06	15	B	2.8	13	1.2	6.4	w198987
w198988	56	64	1.6	.05	20	B	4.4	20	1.7	9.7	w198988
w198989	38	25	.7	.04	10	B	2.6	13	.9	6.1	w198989
w198990	46	22	1.3	.06	9.0	B	2.0	10	.8	6.1	w198990
w198991	90	17	1.1	.08	20	B	7.0	17	.7	7.3	w198991
w198992	81	24	1.6	.09	12	B	4.0	5.2	.1	16	w198992
w198993	81	41	1.7	.08	31	B	9.0	19	.8	13	w198993
w198995	71	20	1.1	.03	13	B	3.4	23	.7	11	w198995
w198996	110	39	3.5	.06	14	B	5.9	15	1.9	12	w198996
w198997	66	68	3.0	.08	22	B	6.5	30	2.5	18	w198997
w198998	64	32	2.4	.08	18	B	9.4	18	2.3	11	w198998
w199933	40	11	1.8	.18	9.0	960	3.7	13	.4	13	w199933
w199934	44	110	1.7	.09	21	620	5.5	22	1.3	13	w199934
w199935	50	33	2.1	.08	18	650	4.7	24	1.6	14	w199935
w199936	42	44	2.7	.19	25	820	15	27	1.8	18	w199936
w199937	47	140	1.3	.05	22	880	4.7	21	.9	16	w199937
w199939	95	22	.9	.08	9.0	930	3.6	11	.7L	10	w199939
w199940	53	35	.9	.06	9.0	1,000	3.0	12	.5	11	w199940
w199941	31	44	1.6	.06	20	640	7.8	20	1.3	14	w199941
w199942	35	120	1.9	.07	25	510	8.1	31	1.7	13	w199942
w199943	36	130	1.3	.09	17	650	4.8	22	1.9	14	w199943
w199944	52	90	2.2	.12	20	740	3.4	25	2.1	13	w199944
w199945	43	130	2.0	.26	27	880	4.4	25	1.0	20	w199945
w199946	31	69	2.2	.22	43	1,200	7.9	39	2.7	56	w199946
w199947	40	110	2.8	.18	35	750	12	41	2.9	46	w199947
w199948	77	290	1.8	.54	12	1,700	8.3	11	.6	14	w199948
w199914	60	150G	1.2	.12	13	B	3.1	14	1.0	8.3	w199914
w199915	100G	170	2.5	.04	8.0	B	3.6	10	.6	9.4	w199915
w199916	52	53	1.9	.05	17	B	5.8	20	1.4	12	w199916
w199917	64	180	3.8	.11	26	B	19	16	1.1	12	w199917
w199918	47	42	2.7	.09	23	B	6.2	19	1.2	16	w199918

Table 6h --Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis--continued

Sample number	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	In-S (ppm)	Sample number
w198978	2.2L	1.0L	0.18	150	2.1	1.4	5.7	0.5	0.030	0.71L	w198978
w198979	2.6L	1.2L	.21	160	2.6	.81L	1.5	.6	.14	.81L	w198979
w198980	2.1L	.9L	.20	83	2.2	.66L	1.1	.4	.11	.66L	w198980
w198981	7.3L	3.3L	.71	220	8.6	2.3L	.66L	1.9	.13	2.3L	w198981
w198982	7.3L	3.3L	.67	170	8.6	3.0	.66L	1.9	.16	2.3L	w198982
w198983	2.6L	1.2L	.30	150	4.0	.83L	1.5	.7	.11	.83L	w198983
w198984	2.4L	1.1L	.26	71	3.2	.97	1.7	.8	.13	.76L	w198984
w198985	1.9L	.9L	.15	150	2.5	1.2	.68	.5	.10	.60L	w198985
w198986	4.6L	2.1L	.46	110	4.3	2.7	3.7	.9	.11	1.4L	w198986
w198987	3.7L	1.7L	.26	140	2.4	1.7	.51	.7	.090	1.2L	w198987
w198988	3.8L	1.7L	.35	110	4.7	1.2L	3.7	.9	.090	1.2L	w198988
w198989	2.6L	1.2L	.20	71	3.4	1.9	.35	.6	.090	.83L	w198989
w198990	2.0L	.9L	.18	130	2.5	.64L	2.0	.5	.090	.64L	w198990
w198991	1.7L	.8L	.41	110	3.2	1.6	.38	.6	.23	.53L	w198991
w198992	2.6L	1.2L	.20	47	8.1	1.7	8.7	.1	.17	.81	w198992
w198993	2.6L	1.2L	.53	55	4.9	.81L	5.2	.6	.090	.81L	w198993
w198995	2.2L	1.0L	.30	47	4.7	1.4	.91	.8	.080	.71L	w198995
w198996	4.8L	2.2L	.39	53	4.3	1.5L	5.6	.8	.11	1.5L	w198996
w198997	5.1L	2.3L	.37	110	5.9	3.3	1.9	1.1	.080	1.6L	w198997
w198998	4.4L	2.0L	.34	140	7.2	1.4L	2.0	.9	.21	1.4L	w198998
w199933	1.9L	.9L	.27	20L	3.7	1.8	5.9	.4	.11	.62L	w199933
w199934	3.8L	1.7L	.43	96	5.1	2.4	2.6	.8	.12	1.2L	w199934
w199935	3.8L	1.7L	.41	64	5.2	2.1	4.5	.9	.18	1.2L	w199935
w199936	4.2L	1.9L	.49	35	4.4	2.5	.76	.9	.24	1.3L	w199936
w199937	2.8L	1.3L	.47	84	5.0	1.6	1.6	.7	.060	.88L	w199937
w199939	2.1L	1.0L	.24	20L	2.9	.67L	3.3	.2	.21	.67L	w199939
w199940	1.7	.8L	.22	22	3.2	1.2	4.7	.5	.15	.55L	w199940
w199941	4.0L	1.8L	.39	72	5.3	2.0	3.1	1.2	.23	1.3L	w199941
w199942	4.5L	2.1L	.38	76	7.2	2.3	7.6	1.3	.22	1.4L	w199942
w199943	4.1L	1.9L	.34	84	4.9	2.4	3.4	.9	.33	1.3L	w199943
w199944	4.0L	1.8L	.39	38	5.9	2.4	5.9	1.2	.18	1.3L	w199944
w199945	2.9L	1.3L	.45	55	7.1	1.7	3.9	1.1	.070	.92L	w199945
w199946	6.9L	3.1L	.71	130	11	2.2L	.94	1.5	.46	2.2L	w199946
w199947	5.6L	2.5L	.65	140	9.6	3.0	1.0	1.2	.12	1.8L	w199947
w199948	2.5L	1.1L	.37	130	2.8	2.3	5.8	.5	.12	.79L	w199948
w199914	3.4	1.5L	.27	44	4.6	2.5	4.6	.6	.21	1.0L	w199914
w199915	2.2L	1.0L	.18	28	4.4	1.3	11	.3	.17	.70L	w199915
w199916	3.5L	1.6L	.32	96	6.9	2.4	2.0	.8	.25	1.1L	w199916
w199917	5.0	2.0L	.63	22	7.6	5.2	5.2	.8	.75	1.4L	w199917
w199918	4.0L	1.8L	.46	24	7.6	3.6	1.6	.9	.29	1.3L	w199918

Table 6h.--Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis--continued

Sample number	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	P (ppm)	Pb (ppm)	Sample number
w198978	5	8.6	0.1	18	0.71	1.0	4.7	4.0	49	2.8	w198978
w198979	6	10	.1	9.2	.93	1.4	5.3L	4.8	25	3.8	w198979
w198980	5	11	.1	8.7	.56	.94	4.3L	4.6	16	3.3	w198980
w198981	23	130	.2	29	1.3	4.6	21	17	220	13	w198981
w198982	21	140	.2	30	1.3	5.0	16	15	160	12	w198982
w198983	8	23	.1	18	2.1	3.8	8.8	8.0	68	6.7	w198983
w198984	7	16	.1	12	.65	1.2	5.0L	6.3	28	4.2	w198984
w198985	5	7.7	.1	13	.60	.85	4.1	2.8	48	3.0	w198985
w198986	13	39	.2	25	1.0	1.9	9.5L	11	45	4.8	w198986
w198987	8	12	.1	66	.85	1.2	7.8L	4.7	15	3.7	w198987
w198988	11	42	.1	21	2.6	1.7	8.0L	9.9	320	5.2	w198988
w198989	6	15	.1	8.1	.71	1.2	6.1	4.7	15	3.8	w198989
w198990	5	11	.1	17	1.0	.91	5.0	6.2	87	2.9	w198990
w198991	13	5.9	.1	50	3.0	.75	5.4	11	200	2.3	w198991
w198992	6	30	.1	15	1.4	1.2	7.9	17	190	8.0	w198992
w198993	18	29	.2	14	1.0	1.2	5.5	8.2	96	10	w198993
w198995	6	21	.1	15	1.2	1.0	5.3	5.1	49	4.2	w198995
w198996	7	9.3	.2	39	3.2	.86	9.9L	10	47	21	w198996
w198997	11	20	.2	42	1.4	1.9	11L	15	100	6.3	w198997
w198998	8	20	.3	40	4.4	2.0	9.2L	9.0	B	8.0	w198998
w199933	4	18	.1	19	1.9	1.1	6.0	11	3	5.5	w199933
w199934	12	34	.1	56	1.9	.86	13	11	83	6.5	w199934
w199935	10	70	.2	28	1.2	1.4	8.0L	7.8	9	3.5	w199935
w199936	13	29	.2	27	2.3	.76	9.9	13	9	4.8	w199936
w199937	11	19	.1	20	1.9	.63	5.9	10	58	6.6	w199937
w199939	4	13	.1	18	4.3	.67	5.5	8.5	4	.95L	w199939
w199940	5	16	.1	15	2.0	.86	5.2	5.2	2	2.8	w199940
w199941	11	26	.2	24	2.7	1.1	8.4L	9.2	12	9.5	w199941
w199942	15	54	.2	41	3.7	1.9	11	15	35	7.4	w199942
w199943	10	39	.2	39	2.8	2.4	10	11	11	1.9L	w199943
w199944	11	92	.2	37	1.8	2.4	15	10	10	3.7	w199944
w199945	14	21	.2	17	2.1	1.6	9.6	7.2	11	3.9	w199945
w199946	24	56	.2	44	4.7	3.1	16	15	42	31	w199946
w199947	19	73	.2	48	2.3	2.0	22	28	20	30	w199947
w199948	6	14	.1	18	4.0	1.5	5.2L	25	4	5.2	w199948
w199914	7	15	.2	27	3.3	2.2	12	6.0	5	1.5L	w199914
w199915	4	8.7	.1	44	3.1	1.3	4.6L	9.6	4	6.6	w199915
w199916	10	27	.2	31	2.2	1.7	11	17	49	14	w199916
w199917	13	20	.2	22	1.4L	4.0	18	28	40	4.4	w199917
w199918	11	24	.2	24	5.8	2.2	15	10	7	7.4	w199918

Table 6h.--Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis--continued

Sample number	Pr-S (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Sample number
w198978	6.9L	44L	0.40	1.9	0.9	0.90	0.20L	32	0.7L	3.0L	w198978
w198979	7.9L	38L	.40	2.1	1.4	1.0	.23L	30	.2	3.0L	w198979
w198980	6.4L	35L	.20	2.1	2.9	1.0	.19L	26	.2	3.0L	w198980
w198981	22L	60	.50	7.8	11	3.7	.66	150	.4	5.0	w198981
w198982	23L	54	.60	7.7	11	3.3	.66L	140	.4	6.0	w198982
w198983	8.1L	38L	.20	3.3	5.1	1.4	.24L	63	.2	3.0L	w198983
w198984	7.3L	35L	.20	3.3	5.1	1.2	.22L	29	.2	3.0L	w198984
w198985	5.8L	31L	.20	2.0	1.0	.80	.17L	57	.1	3.0L	w198985
w198986	14L	24	.50	3.7	2.2	2.2	.41L	46	.3	3.0L	w198986
w198987	11L	38L	.20	2.3	3.6	1.5	.34L	120	.2	3.0L	w198987
w198988	12L	33	.50	3.6	2.1	1.8	.35L	89	.2	3.0L	w198988
w198989	8.0L	32L	.30	2.2	3.9	1.0	.24L	41	.2	3.0L	w198989
w198990	6.2L	32L	.20	1.9	.8	.80	.18L	53	.1	3.0L	w198990
w198991	5.1L	36L	.30	4.5	6.4	1.9	N	130	.3	3.0L	w198991
w198992	7.9L	34L	.20	1.7	6.8	.90	.23L	80	.1	3.0L	w198992
w198993	7.9L	42L	.70	7.0	6.6	2.6	.23L	63	.5	3.0L	w198993
w198995	6.9L	30L	.20	4.0	4.2	1.4	.20L	56	.3	3.0L	w198995
w198996	15L	29	.80	3.4	7.7	1.5	.43L	43	.3	3.0L	w198996
w198997	16L	54L	.40	4.8	1.7	1.7	.47L	80	.3	3.0L	w198997
w198998	14L	32	.40	4.5	9.0	1.7	.40L	36	.3	3.0L	w198998
w199933	6.0L	45L	.40	2.9	2.6	1.1	.18L	25	.2	3.0L	w199933
w199934	12L	55L	1.0	4.4	1.9	2.0	.34L	160	.2	3.0L	w199934
w199935	12L	55L	.20	4.7	3.8	1.9	.35L	42	.3	3.0L	w199935
w199936	13L	60L	.20	4.8	7.5	2.5	.38L	40	.3	3.0	w199936
w199937	8.6L	50L	.40	4.2	2.3	2.2	.25L	190	.3	4.0	w199937
w199939	6.5L	50L	.30	2.1	3.5	1.1	.57	36	.2	3.0L	w199939
w199940	5.3L	50L	.20	2.6	2.6	1.0	.16L	35	.2	3.0L	w199940
w199941	12L	60L	1.1	4.4	3.3	1.9	.37L	37	.3	3.0L	w199941
w199942	14L	70L	1.7	5.3	2.4	2.1	.41L	110	.2	5.0	w199942
w199943	13L	70L	.40	4.2	4.5	1.7	.39L	530	.3	3.0L	w199943
w199944	13L	60L	.40	6.2	3.5	1.9	.37L	61	.3	4.0L	w199944
w199945	8.9L	50L	.20	5.4	3.9	2.4	.26	160	.3	4.0L	w199945
w199946	21L	80L	1.9	8.1	11	3.7	.62L	100	.4	7.0	w199946
w199947	17L	44	2.0	7.3	3.0	3.5	.51	78	.4	10	w199947
w199948	7.7L	50L	.50	2.7	3.9	1.9	.23L	82	.3	3.0L	w199948
w199914	10L	50L	.20	2.9	4.4	1.2	.30L	160	.3	3.0L	w199914
w199915	6.8L	45L	1.0	2.2	1.3	.80	.20	40	.3L	3.0L	w199915
w199916	11L	55L	1.9	3.9	2.0	1.6	.31L	97	.3	3.0L	w199916
w199917	14L	55L	.30	3.5	2.8	2.8	N	170	.6	3.0L	w199917
w199918	27L	60L	.70	4.7	5.5	2.1	.36L	51	.3	3.0L	w199918

Table 6h.--Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis--continued

Sample number	Tl-S (ppm)	U (ppm)	V-S (ppm)	W-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w198978	0.30L	1.1	7.4	1.0L	2.4	0.4	15	8.3	w198978
w198979	.35L	1.0	8.9	1.2L	3.5	.5	7.8	15	w198979
w198980	.28L	.80	7.6	.94L	3.0	.6	7.0	7.7	w198980
w198981	.99L	2.4	49	3.3L	11	1.6	15	46	w198981
w198982	1.0L	2.1	40	3.3L	9.3	1.5	15	37	w198982
w198983	.36L	2.4	15	1.2L	6.9	.8	14	39	w198983
w198984	.32L	1.5	13	1.1L	2.8	.9	11	7.2	w198984
w198985	.26L	3.2	11	.85L	2.2	.5	7.1	7.5	w198985
w198986	.62L	1.5	16	2.1L	6.0	.9	29	16	w198986
w198987	.51L	4.9	8.6	1.7L	3.9L	.6	22	13	w198987
w198988	.52L	1.9	19	1.7L	3.8	.9	16	13	w198988
w198989	.35L	1.1	11	1.2L	3.4	.6	8.3	13	w198989
w198990	.27L	1.1	11	.91L	3.1	.5	10	10	w198990
w198991	.23L	1.2	5.7	.75L	3.3	.9	7.3	4.1	w198991
w198992	.35L	1.8	16	1.2L	6.4	.3	28	11	w198992
w198993	.35L	1.3	13	1.2L	4.9	1.2	17	9.5	w198993
w198995	.30L	2.1	15	1.0L	2.9	.7	10	9.2	w198995
w198996	.65L	3.0	14	2.2L	6.7	1.1	26	11	w198996
w198997	.70L	2.0	30	2.3L	6.6	1.1	35	15	w198997
w198998	.60L	7.1	12	2.0L	5.6	1.3	16	15	w198998
w199933	.26L	.60	13	.88L	7.2	.8	51	14	w199933
w199934	.51L	.70	19	1.7L	6.8	.9	31	14	w199934
w199935	.52L	1.2	17	1.7L	5.4	1.1	19	11	w199935
w199936	.57L	1.0	19	1.9L	6.3	.9	34	13	w199936
w199937	.38L	1.0	20	1.3L	5.2	.8	25	8.1	w199937
w199939	.29L	.30	8.8	.95L	4.2	.5	45	6.8	w199939
w199940	.23L	.40	12	.78L	4.7	.7	23	6.9	w199940
w199941	.55L	.70	13	1.8L	4.6	1.1	18	9.3	w199941
w199942	.62L	.70	27	2.1L	6.0	1.0	33	16	w199942
w199943	.56L	1.0	23	1.9L	8.8	1.3	36	32	w199943
w199944	.55L	2.4	33	1.8L	9.8	1.4	24	24	w199944
w199945	.39L	2.8	22	1.3L	4.1	.9	37	16	w199945
w199946	.94L	2.3	44	3.1L	11	1.5	19	28	w199946
w199947	1.3	2.9	48	2.5L	12	1.5	28	20	w199947
w199948	.34L	.50	14	1.1L	11	.8	110	24	w199948
w199914	.45L	.60	18	1.5L	10	1.2	27	28	w199914
w199915	.30L	.20L	12	1.0L	6.4	.7	13	13	w199915
w199916	.47L	.40	20	1.6L	7.7	.8	9.9	19	w199916
w199917	.60L	.30	16	2.0L	20	1.5	84	26	w199917
w199918	.54L	1.1	24	1.8L	11	1.0	13	31	w199918

Table 6h.--Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis--continued

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w199919	1.4	1.1	0.20	0.023	0.020	0.10	1.9	0.052	0.03	6.0	w199919
w199920	2.3	1.4	.28	.038	.030	.15	2.4	.10	.02	24	w199920
w199921	5.0	2.7	.096	.11	.070	.40	2.4	.16	.04	43	w199921
w199922	1.7	1.2	.19	.033	.030	.15	3.4	.071	.02	33	w199922
w199923	1.2	.83	.14	.023	.020	.097	2.5	.041	.02	59	w199923
w199924	12	7.0	.12	.33	.24	1.5	2.0	.27	.09	7.0	w199924
w199926	1.2	.66	.33	.020	.020	.057	4.3	.035	.03	4.0	w199926
w199927	2.6	2.0	.089	.058	.060	.24	3.3	.069	.03	59	w199927
w199928	4.1	2.3	.18	.089	.060	.34	1.3	.13	.02L	2.0	w199928
w199929	7.5	3.9	.11	.14	.091	.64	4.1	.25	.06	11	w199929
w199930	1.6	.81	.13	.019	.030	.038	3.6	.047	.04	27	w199930
w199931	13	4.8	.21	.30	.20	1.1	2.9	.30	.05	13	w199931
w199741	2.8	1.3	.18	.031	.040	.13	2.5	.085	.10	57	w199741
w199742	1.1	.77	.21	.025	.030	.12	3.0	.041	.04	32	w199742
w199743	1.7	.84	.11	.027	.030	.067	2.2	.089	.07	30	w199743
w199744	7.6	2.4	.075	.094	.050	.31	2.8	.34	.11	34	w199744
w200975	4.4	3.1	.12	.11	.070	.37	3.8	.17	.07	19	w200975
w200976	1.6	.79	.099	.030	.030	.092	3.8	.069	.03	32	w200976
w200977	.83	.78	.27	.018	.030	.027	1.1	.023	.02	3.0	w200977
w200978	2.3	1.8	.051	.044	.030	.16	.40	.067	.06	7.0	w200978
w200979	1.2	.95	.086	.023	.020	.071	3.6	.035	.04	12	w200979
w200980	1.2	.92	.16	.025	.030	.10	2.6	.049	.04	20	w200980
w200981	1.2	.93	.15	.029	.030	.067	2.0	.036	.32	4.0	w200981
w200982	2.5	1.5	.099	.045	.030	.22	.48	.071	.04	11	w200982
w200983	1.7	1.0	.11	.027	.020	.11	2.6	.071	.06	32	w200983
w200984	.59	.53	.31	.014	.020	.013	1.3	.022	.03	10	w200984
w200986	3.3	1.1	.13	.020	.030	.064	2.7	.16	.14	18	w200986
w200987	10	5.2	.11	.24	.16	.82	4.8	.33	.04L	31	w200987
w200988	2.2	1.4	.15	.044	.030	.18	2.2	.068	.08	79	w200988
w200989	2.6	1.7	.37	.061	.050	.16	1.5	.079	.04	5.0	w200989
w201713	2.5	1.8	.091	.031	.030	.14	1.1	.097	.08	2.0	w201713
w201714	3.5	1.3	.36	.081	.070	.27	2.7	.079	.02L	13	w201714
w201715	4.3	2.3	.096	.12	.061	.45	3.5	.10	.04	22	w201715
w201716	2.6	1.4	.57	.045	.030	.18	2.6	.082	.01	88	w201716
w201717	1.5	1.2	.16	.037	.020	.11	1.7	.050	.02	7.0	w201717
w201718	.71	.63	.16	.016	.010	.018	4.8	.013	.05	29	w201718
w201719	2.8	2.6	.10	.030	.030	.10	1.4	.19	.04	9.0	w201719
w201720	1.4	.83	.26	.036	.016	.10	3.5	.042	.03	5.0	w201720
w201721	1.2	.73	.26	.024	.020	.064	3.2	.032	.03	7.0	w201721
w201580	10	7.7	.066	.29	.20	1.7	1.9	.34	.13	34	w201580

Table 6h.--Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis--continued

Sample number	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Cl (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Sample number
w199919	95G	95G	1.4	0.13	11	B	3.0	11	0.5	9.5	w199919
w199920	39	36	1.4	.04	14	B	3.1	15	.6	11	w199920
w199921	53	61	2.7	.08	21	B	7.4	25	2.0	14	w199921
w199922	44	48	2.6	.07	14	B	3.3	14	.7	10	w199922
w199923	83G	26	2.6	.12	11	B	2.7	11	.5	8.3	w199923
w199924	55	120	2.3	.36	61	B	15	53	4.8	35	w199924
w199926	44	32	1.5	.14	7.0	B	2.1	8.7	.4	8.0	w199926
w199927	44	27	3.6	.21	27	B	32	31	1.2	26	w199927
w199928	62	59	2.4	.09	20	B	4.1	24	1.6	15	w199928
w199929	52	150	1.9	.08	36	B	4.8	33	2.8	18	w199929
w199930	110G	130	1.5	.28	11	B	3.7	13	.2	11	w199930
w199931	68	500	4.1	.09	38	B	3.1	43	6.1	19	w199931
w199741	41	50	2.5	.04	27	2,100	9.6	18	.6	14	w199741
w199742	91G	210	4.3	.06	8.0	1,700	3.4	9.9	.6	9.1	w199742
w199743	35	48	1.0	.06	11	2,100	3.4	14	.2	10	w199743
w199744	29	140	4.3	.10	37	570	6.6	35	1.0	23	w199744
w200975	52	360	2.9	.15	26	1,100	7.8	27	1.3	18	w200975
w200976	46	18	3.5	.08	12	1,100	6.4	11	.4	6.9	w200976
w200977	71	17	1.7	.09	8.0	1,700	3.9	8.0	.3	8.3	w200977
w200978	69	37	6.0	.10	34	1,300	6.8	25	1.0	18	w200978
w200979	70	31	3.7	.14	9.0	1,100	3.2	11	.4	10	w200979
w200980	64	150	1.4	.05	10	1,600	2.7	11	.6	10	w200980
w200981	56	9	2.5	.12	8.0	2,000	3.0	9.4	.3	8.0	w200981
w200982	63	67	2.3	.06	18	1,300	8.3	15	.8	14	w200982
w200983	39	22	1.4	.07	9.0	1,300	5.7	9.9	.4	8.2	w200983
w200984	79	6	2.3	.04	8.0	1,400	1.8	7.7	.1	8.0	w200984
w200986	57	12	1.4	.05	18	1,300	5.4	13	.3	14	w200986
w200987	60	180	2.6	.09	36	470	6.8	45	3.5	20	w200987
w200988	42	50	2.1	.02	19	1,100	7.0	15	.9	10	w200988
w200989	52	51	1.7	.08	12	1,100	3.5	17	.9	18	w200989
w201713	44	50	2.3	.12	18	1,400	3.7	24	.6	21	w201713
w201714	47	64	2.0	.10	13	180	4.8	26	1.4	12	w201714
w201715	38	59	1.3	.32	19	180	6.5	25	1.5	36	w201715
w201716	34	210	1.9	.47	15	740	6.6	17	.8	15	w201716
w201717	29	180	1.7	.12	9.0	850	3.1	12	.4	9.1	w201717
w201718	31	13	4.4	.70	14	950	34	10	.4L	4.7	w201718
w201719	30	57	3.1	.87	29	940	3.3	37	.3	24	w201719
w201720	25	35	1.5	.10	7.0	210	2.4	11	.5	4.9	w201720
w201721	46	48	2.0	.09	11	1,300	3.2	8.1	.3	5.8	w201721
w201580	62	170	4.0	.49	81	700	12	67	6.4	110	w201580

Table 6h.--Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis--continued

Sample number	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	In-S (ppm)	Sample number
w199919	2.1L	1.0L	0.22	32	3.3	1.5	2.5	0.4	0.16	0.67L	w199919
w199920	2.7L	1.2L	.23	44	5.2	1.8	3.7	.7	.38	.86L	w199920
w199921	4.6L	2.1L	.37	64	8.9	2.5	2.5	1.2	.14	1.5L	w199921
w199922	2.6L	1.2L	.28	38	5.2	2.2	4.7	.6	.18	.84L	w199922
w199923	1.8L	.8L	.21	60	3.7	1.7	7.1	.4	.27	.58L	w199923
w199924	10L	4.6L	.98	220	15	3.2	.92L	2.1	.15	3.2L	w199924
w199926	2.5L	1.2	.26	20L	3.2	2.3	3.7	.3	.19	.79L	w199926
w199927	3.3L	1.5L	.52	20L	7.6	2.6	3.0	.6	.20	1.1L	w199927
w199928	3.7L	1.7L	.48	96	7.9	2.2	5.0	1.1	.10	1.2L	w199928
w199929	7.1L	3.2L	.57	76	10	3.9	2.9	2.4	.32	2.3L	w199929
w199930	3.6	1.9	.38	20L	3.1	3.0	4.3	.5	.23	.77L	w199930
w199931	9.9L	4.5L	.56	220	11	5.0	1.4	2.1	.13	3.2L	w199931
w199741	2.8L	1.8	.64	88	8.0	2.8	6.5	.7	.46	.90L	w199741
w199742	2.0L	.9L	.22	620	4.0	1.9	7.5	.3	.17	.64L	w199742
w199743	2.0L	.9L	.22	1,300	3.4	2.0	3.8	.8	.45	.65L	w199743
w199744	5.9L	2.7L	.60	170	6.7	3.2	1.3	2.6	.62	1.9L	w199744
w200975	4.9L	2.2L	.54	160	11	3.4L	7.2	1.4	.23	1.6L	w200975
w200976	2.5L	1.2L	.18	110	4.9	2.8	4.5	.6	.37	.81L	w200976
w200977	1.3L	.6L	.20	84	3.1	1.3	5.0	.2	.11	.41L	w200977
w200978	3.4	1.3	.77	76	7.0	2.0	2.0	.6	.030	.71L	w200978
w200979	2.2L	1.0L	.24	44	5.6	1.5L	11	.3	.17	.70L	w200979
w200980	2.0L	.9L	.19	64	3.9	1.9	4.1	.4	.11	.64L	w200980
w200981	1.8L	.8L	.32	56	6.4	1.2L	6.9	.4	.050	.56L	w200981
w200982	2.2L	1.0L	.45	110	6.9	1.5L	4.8	.6	.030	.69L	w200982
w200983	2.2L	1.0L	.20	76	4.7	1.5L	3.6	.5	.41	.69L	w200983
w200984	1.2L	.9	.18	56	3.6	1.5	9.0	.2	.17	.37L	w200984
w200986	3.1L	1.4L	.35	84	6.9	2.1L	4.4	1.4	.30	1.0L	w200986
w200987	9.4L	4.3L	.52	370	19	6.4L	4.3	2.4	.29	3.0L	w200987
w200988	2.6L	1.2L	.31	100	7.1	1.8	7.6	.6	.26	.83L	w200988
w200989	3.0L	1.4L	.34	140	6.3	2.1L	6.2	.6	.16	.97L	w200989
w201713	2.6L	1.2L	.36	25	9.0	1.7L	2.6	.8	.070	.81L	w201713
w201714	3.6L	1.6L	.30	120	5.9	2.4L	8.0	.8	.10	1.1L	w201714
w201715	4.6L	2.1L	.38	50	8.4	3.2L	3.6	1.0	.080	1.5L	w201715
w201716	3.3L	1.5L	.35	20	5.3	3.4	3.0	.7	.25	1.0L	w201716
w201717	2.0L	.9L	.26	20L	5.0	1.8	4.4	.4	.11	.64L	w201717
w201718	2.9	1.1L	.78	20L	9.0	2.5	12	.4L	.27	.76L	w201718
w201719	3.1L	1.4	.53	25	9.7	2.7	3.7	1.3	.18	1.0L	w201719
w201720	2.5L	1.1L	.16	20L	3.9	1.7L	5.8	.4	.070	.78L	w201720
w201721	3.1	1.3	.20	66	3.3	2.0	5.9	.3	.12	.69L	w201721
w201580	9.7L	4.4L	1.4	340	20	6.6L	1.3	2.5	.23	3.1L	w201580

Table 6h.--Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis--continued

Sample number	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	P (ppm)	Pb (ppm)	Sample number
w199919	7	19	0.1	25	2.2	1.1	4.4L	6.1	7	3.6	w199919
w199920	8	16	.1	21	4.3	1.5	8.9	9.0	6	8.7	w199920
w199921	12	63	.2	27	3.6	2.7	15	18	14	11	w199921
w199922	8	19	.1	37	1.9	1.3	8.8	7.8	26	14	w199922
w199923	6	11	.1	28	2.4	.91	6.9	6.1	7	6.6	w199923
w199924	33	46	.4	96	.92L	2.3	28	38	82	17	w199924
w199926	3	6.2	.2	20	5.3	1.6	5.2L	5.7	1	1.1L	w199926
w199927	14	35	.2	110	5.9	1.1	15	53	8	15	w199927
w199928	11	89	.2	32	1.0	3.7	13	8.6	6	4.4	w199928
w199929	19	100	.3	30	2.9	5.2	18	12	18	8.7	w199929
w199930	5	8.9	.3	14	8.5	2.2	8.3	8.1	2	2.4	w199930
w199931	21	38	.4	59	4.1	8.1	21L	18	36	9.9	w199931
w199741	12	10	.2	12	4.1	2.2	18	39	6	27	w199741
w199742	4	6.5	.2	34	2.6	.91	4.2L	7.3	2	6.3	w199742
w199743	6	7.2	.1	14	3.2	2.1	5.8	11	3	10	w199743
w199744	20	23	.3	26	1.1	4.6	16	13	15	17	w199744
w200975	13	76	.3	49	6.5	1.8	10L	22	28	31	w200975
w200976	6	7.1	.1	44	4.4	2.1	7.1	12	1	12	w200976
w200977	3	12	.1	27	1.7	.47	2.8	7.1	1	2.2	w200977
w200978	17	29	.3	3.9	2.4	1.1	14	17	6	9.4	w200978
w200979	4	15	.1	24	4.5	1.3	6.9	11	1	5.4	w200979
w200980	5	15	.1	21	1.6	.92	4.6	4.7	2	7.3	w200980
w200981	3	14	.2	21	1.9	.96	4.6	8.8	2	7.0	w200981
w200982	10	16	.2	7.1	4.2	1.4	8.8	31	28	11	w200982
w200983	5	7.8	.1	21	3.2	1.4	5.2	12	3	11	w200983
w200984	4	5.8	.1	33	2.4	1.2	5.3	5.8	21	1.9	w200984
w200986	9	16	.2	19	3.0	3.0	9.3	23	1	46	w200986
w200987	21	150	.3	94	9.0	5.1	20L	23		36	w200987
w200988	11	13	.1	18	3.2	1.2	8.0	11	23	11	w200988
w200989	6	47	.2	43	2.1	1.5	6.3L	10		5.8	w200989
w201713	10	30	.1	6.4	2.4	3.6	11	9.6	14	5.3	w201713
w201714	7	8.3	.2	70	10	5.4	7.5L	14	74	2.3	w201714
w201715	11	25	.2	27	2.7	.84	9.7L	20	7	8.0	w201715
w201716	8	19	.2	44	6.8	4.7	6.8L	16	21	4.9	w201716
w201717	5	30	.1	17	1.6	1.6	6.2	7.4	2	1.5	w201717
w201718	6	8.7	.4	150	2.4	1.2	5.7	44	10	2.9	w201718
w201719	16	46	.2	9.9	2.3	6.6	13	9.6	6	21	w201719
w201720	4	6.0	.1	43	.78L	1.8	5.2L	6.3	14	2.2	w201720
w201721	5	8.5	.2	40	4.4	3.3	4.6L	6.7	33	.99	w201721
w201580	46	150	.5	21	4.4	4.4	43	36	B	31	w201580

Table 6h.--Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis--continued

Sample number	Pr-S (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Sample number
w199919	6.5L	40L	0.30	2.4	3.2	1.0	0.19L	410	0.2	3.0L	w199919
w199920	8.4L	50L	1.3	3.3	5.0	1.1	.25L	46	.2	3.0L	w199920
w199921	14L	60L	1.6	9.4	1.7	1.8	.42L	72	.3	3.0L	w199921
w199922	18L	50L	1.1	3.3	1.6	1.3	.48	140	.3	3.0	w199922
w199923	5.6L	40L	1.2	2.4	1.0	1.0	.17	120	.2	3.0	w199923
w199924	31L	100L	.50	11	19	4.8	.92L	140	.7	10	w199924
w199926	7.7L	40L	.20	1.8	1.8	1.1	N	35	.3	3.0L	w199926
w199927	14	60L	1.5	4.1	9.7	2.6	.30L	40	.4	5.0	w199927
w199928	11L	50L	.30	6.1	3.5	2.1	.34L	60	.5	3.0L	w199928
w199929	22L	60L	.40	7.1	13	3.0	.64L	64	.5	7.0	w199929
w199930	7.5L	40L	.40	2.4	5.5	1.6	.22L	120	.5	3.0	w199930
w199931	31L	80L	.40	8.6	9.6	3.0	.90L	120	.5	9.0	w199931
w199741	19L	70L	1.7	5.5	5.5	3.2	.39	32	.4	4.0	w199741
w199742	6.2L	60L	.50	2.0	1.0	1.0	.36	37	.2	3.0L	w199742
w199743	14L	60L	1.5	2.3	6.9	1.1	.19L	28	.2	3.0L	w199743
w199744	18L	75L	.80	6.2	20	3.0	.54L	56	.5	7.0	w199744
w200975	15L	70L	1.4	6.0	7.7	2.7	.45L	90	.5	5.0L	w200975
w200976	7.8L	45L	.60	2.4	2.7	1.1	N	36	.2	6.0L	w200976
w200977	4.0L	35L	.20	2.0	2.1	1.0	.12L	27	.1	3.0L	w200977
w200978	6.9L	45L	1.7	5.0	1.5	3.6	.40	58	.5	5.0	w200978
w200979	6.8L	40L	.20	2.9	2.3	1.1	N	36	.2	4.0L	w200979
w200980	6.3L	40L	.40	2.2	1.5	.80	.18L	39	.1	3.0L	w200980
w200981	5.4L	40L	.20	3.2	1.7	1.3	.56	25	.3	3.0L	w200981
w200982	6.7L	22	2.1	3.3	1.1	2.1	.40	130	.3	3.0L	w200982
w200983	6.7L	40L	1.4	1.9	3.2	.80	.20L	31	.2	3.0	w200983
w200984	3.6L	30L	.20	1.6	2.8	.90	.11L	53	.2	3.0L	w200984
w200986	9.7L	40L	1.1	2.7	6.2	1.9	.57	37	.3	3.0L	w200986
w200987	29L	43	1.3	9.0	11	3.0	.86L	73	.4	6.0L	w200987
w200988	8.1L	50L	1.7	3.1	1.6	1.6	.24L	98	.2	4.0L	w200988
w200989	9.4L	40L	.30	4.0	3.8	1.5	.28L	48	.3	4.0L	w200989
w201713	7.9L	60L	.60	5.8	4.6	1.6	.23L	110	.2	3.0L	w201713
w201714	24L	70L	.70	3.8	1.7	1.6	.33L	99	.3	4.0L	w201714
w201715	14L	60L	.60	5.2	2.3	1.6	.42L	55	.2	5.0	w201715
w201716	10L	50L	2.1	3.8	2.3	1.5	.30L	130	.2	3.0L	w201716
w201717	6.3L	40L	.20	3.2	3.2	1.0	.18L	57	.2	3.0L	w201717
w201718	7.4L	40L	.60	4.4	2.0L	2.9	N	110	.6	3.0L	w201718
w201719	9.7L	50L	.60	7.9	19	2.5	.29L	56	.4	7.0	w201719
w201720	7.6L	40L	.20	2.1	.8	.70	N	77	.2L	3.0L	w201720
w201721	6.7L	40L	.20	1.9	1.6	.90	N	71	.3	3.0L	w201721
w201580	30L	94	2.6	15	12	7.5	1.3	110	.8	11	w201580

Table 6h.--Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis--continued

Sample number	Tl-S (ppm)	U (ppm)	V-S (ppm)	W-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w199919	0.29L	0.20	11	0.95L	5.3	0.6	20	12	w199919
w199920	.37L	.60	16	1.2L	4.9	.7	14	12	w199920
w199921	.63L	1.2	30	2.1L	9.9	1.3	23	30	w199921
w199922	.36L	.50	14	1.2L	6.7	1.0	17	10	w199922
w199923	.25L	.40	15	.83L	6.3	.8	20	9.1	w199923
w199924	1.4L	2.0	60	4.6L	13	2.1	110	27	w199924
w199926	.34L	.30	9.0	1.1L	12L	1.2	23	16	w199926
w199927	.46L	1.6	36	1.5L	10	1.4	36	11	w199927
w199928	.50L	1.6	32	1.7L	13	1.3	24	39	w199928
w199929	.97L	1.6	35	3.2L	14	1.6	27	55	w199929
w199930	.33L	.50	13	1.1L	18	2.3	110	26	w199930
w199931	1.4L	6.5	50	4.5L	19	1.9	22	81	w199931
w199741	.39L	.70	28	1.3L	12	1.2	17	22	w199741
w199742	.27L	.10	8.8	.91L	8.0	.8	14	11	w199742
w199743	.28L	1.8	11	.93L	5.0	.6	14	11	w199743
w199744	.80L	1.8	18	2.7L	12	1.8	29	43	w199744
w200975	.67L	3.7	29	2.2L	8.7	1.7	58	21	w200975
w200976	.35L	7.6	11	1.2L	6.1	.9	22	22	w200976
w200977	.18L	1.9	10	.59L	4.7	.6	34	5.5	w200977
w200978	.71	1.3	42	1.0L	10	1.9	30	9.4	w200978
w200979	.30L	1.8	17	1.0L	8.2	.7	40	15	w200979
w200980	.28L	.60	7.1	.92	3.6	.6	17	7.9	w200980
w200981	.24L	1.6	6.7	.80L	6.8	1.4	56	10	w200981
w200982	.30L	.80	20	.99L	6.6	1.2	31	14	w200982
w200983	4.7	.50	7.2	.99L	3.6	.6	42	11	w200983
w200984	.16L	.40	9.0	.53L	8.0	.5	20	12	w200984
w200986	.43L	1.1	12	1.4L	5.0	1.1	39	27	w200986
w200987	1.3L	9.1	42	4.3L	5.6	1.8	35	29	w200987
w200988	3.6	.60	12	1.2L	4.2	.7	10	13	w200988
w200989	.41L	1.9	26	1.4L	7.7	1.1	39	12	w200989
w201713	.35L	1.4	37	1.2L	9.9	.8	13	39	w201713
w201714	.49L	2.1	34	1.6L	13	.9	24	86	w201714
w201715	.63L	1.4	27	2.1L	5.0	1.1	61	14	w201715
w201716	.44L	1.2	22	1.5L	13	.9	92	44	w201716
w201717	.28L	.80	14	.92L	8.6	.8	16	14	w201717
w201718	.33L	.80	8.5	1.1L	15	2.3	210	5.1	w201718
w201719	.43L	2.3	37	1.4L	14	1.4	11	74	w201719
w201720	.34L	.50	12	1.1L	4.8	.4	10	18	w201720
w201721	.30L	.70	11	.99L	13	1.4	20	28	w201721
w201580	2.2	5.6	110	4.4L	25	2.9	80	42	w201580

Table 6h.--Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis--continued

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
W201581	2.0	0.90	0.67	0.021	N	0.14	3.0	0.054	0.01L	4.0	W201581
W201582	3.9	2.1	.16	.12	.070	.40	4.0	.12	.06	21	W201582
W201583	5.1	2.9	.18	.099	.087	.44	4.8	.14	.05	130	W201583
W201584	4.4	2.0	.34	.13	.080	.37	3.0	.12	.02L	13	W201584
W201585	1.6	.95	.14	.025	.020	.10	2.3	.057	.02	29	W201585
W201586	1.7	1.3	.50	.049	.040	.12	1.6	.053	.02	2.0	W201586
W201587	4.6	.57	.17	.009	.029	.029	1.6	.019	.04	12	W201587
W201589	1.6	1.1	.23	N	.020	.031	2.9	.071	.03	51	W201589
W201590	1.3	.97	.24	.023	.020	.058	1.7	.032	.02	4.0	W201590
W201592	2.0	1.2	.080	.032	N	.15	2.6	.083	.01	30	W201592
W201593	5.2	2.7	.13	.13	.070	.51	1.6	.16	.04	18	W201593
W201594	2.2	1.2	.32	.034	.030	.12	2.7	.061	.04	9.0	W201594
W201595	4.3	2.2	.12	.11	.040	.42	3.0	.14	.06	6.0	W201595
W201596	2.4	1.0	.19	N	N	.093	1.3	.067	.04	6.0	W201596
W201597	12	4.7	.21	.28	.20	1.1	1.6	.28	.08	5.0	W201597
W201598	1.6	1.0	.10	.022	.020	.099	2.0	.049	.05	36	W201598
W201599	3.6	1.3	.18	.15	.080	.27	1.0	.090	.03	7.0	W201599
W201600	5.2	2.0	.96	.14	.12	.45	2.7	.11	.02L	17	W201600
W201601	5.1	1.8	1.1	.034	.19	.54	2.2	.11	.02L	5.0	W201601
W201602	2.6	1.4	.27	.027	N	.085	2.1	.072	.03	21	W201602
W201603	12	4.9	.28	.28	.20	1.1	3.5	.30	.09	21	W201603

Table 6h.--Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis--continued

Sample number	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Cl (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Sample number
w201581	50	36	1.3	0.10	14	300	3.2	15	1.2	5.5	w201581
w201582	46	55	1.9	.13	19	800	5.4	23	1.5	16	w201582
w201583	34	58	4.2	.26	35	600	26	32	2.2	31	w201583
w201584	64	46	2.4	.20	20	1,100	4.4	22	1.8	13	w201584
w201585	48	94	4.2	.09	9.0	1,100	4.3	11	.4	8.1	w201585
w201586	57	89	2.3	.09	11	1,000	3.7	14	.6	10	w201586
w201587	51	35	2.0	.11	4.0	1,400	2.2	6.9	.1	5.8	w201587
w201589	40	15	2.1	.06	12	900	2.6	11	.2L	8.2	w201589
w201590	62	15	1.2	.12	10	1,300	3.8	11	.3	11	w201590
w201592	39	62	4.6	.08	13	B	5.0	15	.8	9.5	w201592
w201593	63	91	3.0	.09	21	800	3.4	28	2.4	14	w201593
w201594	49	14	2.0	.11	18	1,300	4.2	14	1.0	10	w201594
w201595	54	50	2.8	.08	11	550	3.0	12	1.0	16	w201595
w201596	51	27	1.1	.09	12	B	2.8	10	.4	9.1	w201596
w201597	64	240	2.5	.64	37	300	4.5	48	5.1	23	w201597
w201598	46	19	1.9	.13	10	1,000	5.3	14	.6	14	w201598
w201599	68	48	1.2	.08	14	220	2.7	22	1.7	7.1	w201599
w201600	62	88	2.4	.13	20	200	4.5	27	2.2	14	w201600
w201601	53	75	1.0	.12	26	200	5.1	34	2.6	13	w201601
w201602	64	14	2.2	.10	13	B	5.0	12	.5	9.7	w201602
w201603	64	96	2.8	.64	55	300	9.9	47	4.7	20	w201603

Table 6h.--Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis--continued

Sample number	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	In-S (ppm)	Sample number
W201581	3.1L	1.4L	0.28	350	3.3	2.1L	3.8	0.7	0.21	0.99L	W201581
W201582	4.6L	2.1L	.39	140	6.5	3.4	3.2	1.0	.74	1.5L	W201582
W201583	5.8L	2.6L	.92	160	10	4.2	12	1.1	1.1	1.8L	W201583
W201584	4.4L	2.0L	.49	140	6.4	2.6	9.8	1.0	.27	1.4L	W201584
W201585	2.1L	1.0L	.14	56	4.3	2.1	4.4	.5	.23	.67L	W201585
W201586	2.5L	1.1L	.34	52	5.1	2.5	5.0	.5	.22	.80L	W201586
W201587	3.1L	1.4L	.09	34	2.3	2.1L	5.9	.1	.12	.99L	W201587
W201589	2.4L	1.1L	.26	33	3.9	2.3	2.9	.6	.86	.76L	W201589
W201590	1.8L	.8L	.26	50	3.2	1.2L	.58	.3	.29	.58L	W201590
W201592	2.5L	1.2L	.27	56	4.6	2.2	2.1	.7	.46	.81L	W201592
W201593	4.6L	2.1L	.45	96	8.2	3.2L	2.7	1.3	.31	1.5L	W201593
W201594	2.9L	1.3L	.42	36	4.8	2.2	8.5	.6	.36	.91L	W201594
W201595	4.4L	2.0L	.22	96	7.2	3.0	4.0	.6	.42	1.4L	W201595
W201596	2.2L	1.0L	.25	38	3.2	1.6	7.9	.7	.20	.71L	W201596
W201597	9.3L	4.2L	.60	230	12	6.4L	2.5	2.4	.26	3.0L	W201597
W201598	2.0L	.9L	.24	50	4.5	1.9	4.2	.4	.46	.64L	W201598
W201599	3.0L	1.4L	.33	190	5.2	2.0L	5.2	.8	.14	.95L	W201599
W201600	5.2L	2.4L	.39	240	6.6	3.6	7.3	1.1	.11	1.7L	W201600
W201601	5.3L	2.4L	.55	430	4.8	3.6L	4.1	1.3	.10	1.7L	W201601
W201602	2.8L	1.3L	.37	63	3.6	2.0	4.6	.6	.46	.90L	W201602
W201603	10L	4.6L	.77	260	9.6	6.9L	3.7	2.4	.52	3.2L	W201603

Table 6h.--Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis--continued

Sample number	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	P (ppm)	Pb (ppm)	Sample number
w201581	7	9.9	0.2	160	1.8	1.7	6.5L	6.0	B	2.8	w201581
w201582	10	78	.2	34	4.0	3.2	9.9	9.7	B	10	w201582
w201583	15	42	.4	94	8.6	2.4	17	42	B	29	w201583
w201584	9	24	.3	36	3.0	2.4	10	19	B	10	w201584
w201585	6	9.3	.1	36	3.9	2.4	6.8	8.9	B	6.2	w201585
w201586	7	40	.2	30	1.9	1.8	6.3	9.2	B	3.4	w201586
w201587	2	6.6	.1	21	3.8	1.3	6.5L	16	B	3.5	w201587
w201589	9	22	.1	15	.76L	2.2	6.9	6.7	B	8.0	w201589
w201590	6	22	.1	19	2.2	1.2	6.6	6.6	B	3.3	w201590
w201592	7	12	.1	30	2.2	1.5	5.4	9.1	B	7.1	w201592
w201593	12	110	.2	25	1.7	2.7	11	9.3	B	14	w201593
w201594	8	18	.2	42	4.6	1.7	8.2	12	B	8.1	w201594
w201595	6	72	.1	32	2.8	3.8	12	17	B	8.2	w201595
w201596	7	11	.2	15	1.5	2.5	7.4	9.2	B	3.6	w201596
w201597	21	47	.3	47	5.9	6.4	21	17	B	14	w201597
w201598	5	13	.2	18	4.3	1.5	7.1	13	B	10	w201598
w201599	7	11	.2	19	3.1	3.3	9.4	8.4	B	4.9	w201599
w201600	11	17	.2	150	6.2	2.6	11L	14	B	7.8	w201600
w201601	13	13	.3	180	2.7	1.7	11L	9.7	B	3.6	w201601
w201602	6	18	.2	23	3.1	1.7	8.3	14	B	3.8	w201602
w201603	30	50	.3	73	6.4	6.4	35	37	B	15	w201603

Table 6h.--Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis--continued

Sample number	Pr-S (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Sample number
w201581	9.7L	40L	0.30	3.3	2.5	1.3	0.28L	98	0.3	3.0L	w201581
w201582	32L	60L	.80	4.8	5.6	1.9	.42L	57	.2	6.0	w201582
w201583	39L	27	4.8	6.4	3.4	4.7	.52L	66	.6	8.0	w201583
w201584	14L	50L	2.3	5.0	4.7	2.3	.40L	48	.5	6.0	w201584
w201585	6.5L	40L	1.3	2.5	2.0	.90	.19L	40	.1	3.0L	w201585
w201586	17L	35L	.50	3.6	4.2	1.4	.23L	60	.3	3.0L	w201586
w201587	9.6L	30L	.50	1.2	1.1	.40	.28L	30	.1	3.0L	w201587
w201589	7.3L	30L	2.1	2.9	9.9	1.2	.22L	130	.2	3.0L	w201589
w201590	5.6L	30L	2.0	2.4	4.9	1.1	.17L	53	.2	3.0L	w201590
w201592	7.8L	10	1.1	2.9	2.2	1.2	.23L	38	.2	3.0L	w201592
w201593	14L	27	.60	5.7	6.2	2.0	.42L	59	.2	5.0	w201593
w201594	20L	40L	.40	3.3	7.9	2.1	.26L	30	.3	3.0L	w201594
w201595	14L	40L	.40	2.5	1.2	1.2	.40L	60	.2	5.0	w201595
w201596	15L	30L	.30	2.0	5.3	1.3	.20L	63	.2	3.0L	w201596
w201597	29L	59	.50	8.5	14	3.2	.85L	110	.6	6.0L	w201597
w201598	6.2L	30L	1.8	3.0	2.9	1.2	.18L	31	.3	3.0L	w201598
w201599	9.2L	40L	.40	2.9	2.9	1.8	.27L	88	.2	4.0L	w201599
w201600	16L	37	.50	4.5	1.7	1.8	.47L	120	.3	4.0	w201600
w201601	16L	36	.60	5.7	1.9	2.9	.48L	150	.5	9.0	w201601
w201602	8.7L	30L	.40	2.7	3.5	1.6	.26L	32	.3	B	w201602
w201603	31L	69	1.1	8.4	13	4.6	.92L	87	.4	3.0L	w201603

Table 6h.--Major, minor, and trace element composition of 101 bituminous coal samples from Ohio reported on whole-coal basis--continued

Sample number	Tl-S (ppm)	U (ppm)	V-S (ppm)	W-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w201581	0.43L	0.70	10	1.4L	5.7	0.8	11	31	w201581
w201582	.63L	3.2	21	2.1L	7.4	1.0	20	23	w201582
w201583	11	3.2	37	2.6L	17	2.1	89	24	w201583
w201584	.60L	4.1	20	2.0L	11	1.6	38	24	w201584
w201585	.29L	.60	12	.95L	9.5	.8	39	21	w201585
w201586	.34L	1.0	21	1.1L	13	1.0	23	21	w201586
w201587	.42L	1.3	7.8	1.4L	5.4	.6	9.4	8.5	w201587
w201589	7.2	.70	12	1.1L	8.6	.7	7.0	25	w201589
w201590	.25L	.50	11	.83L	6.8	.5	27	14	w201590
w201592	.35L	.70	11	1.2L	7.8	.9	20	20	w201592
w201593	.63L	2.5	30	2.1L	11	1.3	16	27	w201593
w201594	.39L	2.4	14	1.3L	9.4	1.2	14	18	w201594
w201595	.60L	1.8	24	2.0L	12	.6	12	40	w201595
w201596	.30L	.50	12	1.0L	9.8	1.0	20	26	w201596
w201597	1.3L	8.8	59	4.2L	16	1.6	180	68	w201597
w201598	4.6	1.1	15	.91L	8.0	.7	27	15	w201598
w201599	.41L	4.7	27	1.4L	7.8	.8	12	20	w201599
w201600	.71L	1.8	33	2.4L	11	1.0	24	31	w201600
w201601	.73L	5.6	29	2.4L	11	1.5	29	22	w201601
w201602	.38L	B	11	1.3L	10	1.0	22	18	w201602
w201603	1.4L	1.0	50	4.6L	18	2.0	100	73	w201603

Summary of the analytical data on 25 Maryland bituminous coal samples

Data on 8 Maryland coal samples were published by Swanson and others (1976). The distribution of the 25 samples of this report is shown on figure 5. The 25 samples were obtained from 5 different coal beds. The largest number of samples (11) were from the Upper Freeport coal bed. Statistical comparisons are reported in tables 7a, b, and c; the analytical data in tables 7e, f, g, and h. Additional descriptons and locations of the samples are given in table 7d.

In the following paragraphs the geometric means of the analytical data of the Maryland coal samples are compared with those of the 644 bituminous coal samples of this report.

The Bureau of Mines type analyses were performed on only 12 of the 25 coal samples submitted. Comparison of the geometric means for the proximate and ultimate analyses shows higher values only for fixed carbon, ash and sulfur in Maryland coal; other components, particularly volatile matter and oxygen, are much lower in Maryland coal. The higher fixed carbon, lower volatile matter and higher free-swelling index for Maryland coal, compared to the average coal, indicate that Maryland coal is of higher rank. The ash-fusion temperatures of the Maryland coal ash range from 80° to 100°C higher than the average bituminous coal of the report.

The geometric means for 6 of the major and minor oxides are about equal in the two sets of data. Only CaO, Na_2O and MnO are significantly lower and Fe_2O_3 and P_2O higher in the average Maryland coal ash.

Of the 38 trace elements listed in table 7c, the geometric means for only 6 elements (B, Ba, Be, Mn, Nd, and Y) are lower in Maryland coal.

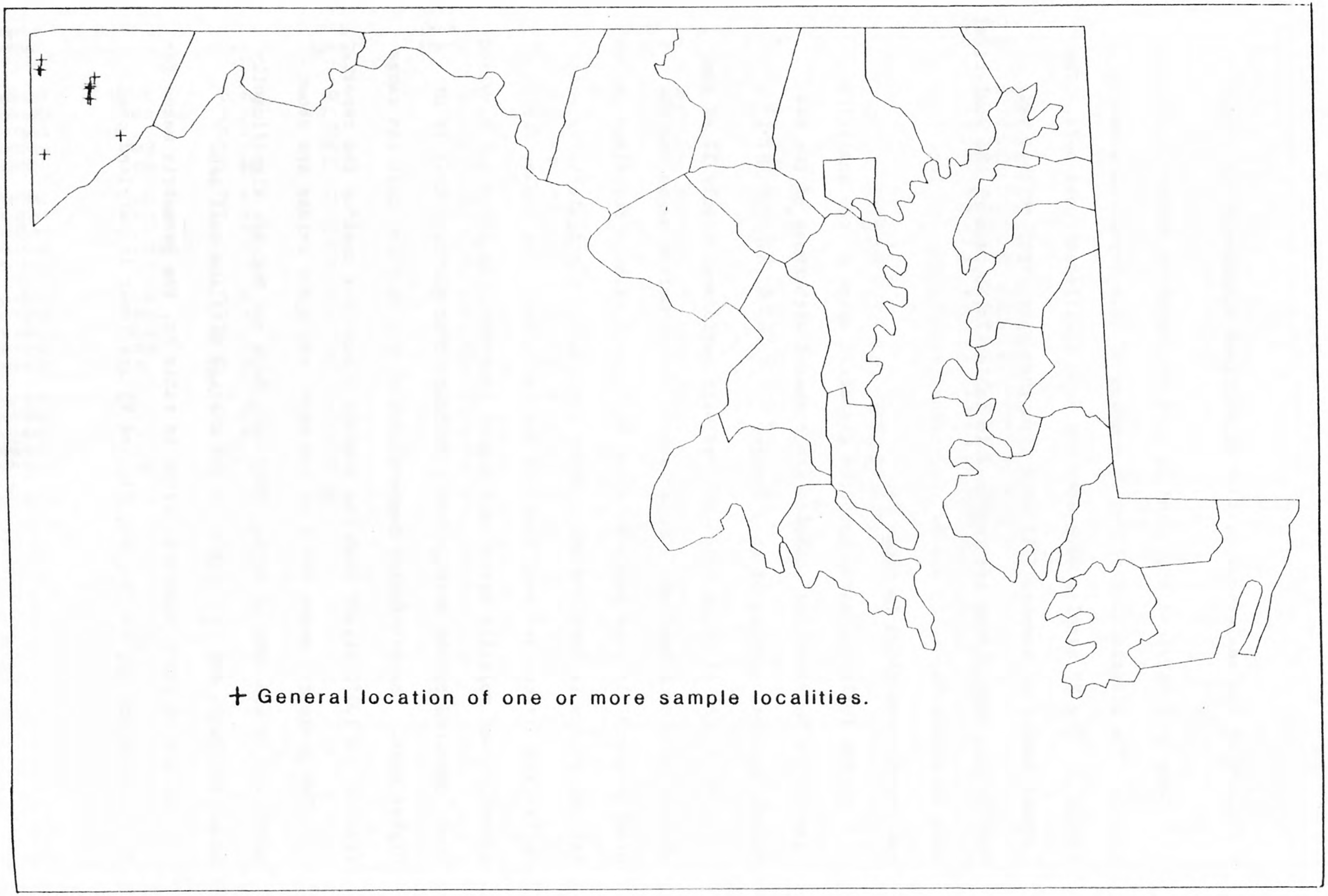

Figure 5.--Distribution of Maryland bituminous coal samples.

Table 7a.-- Arithmetic mean, observed range, geometric mean, and geometric deviation of proximate and ultimate analyses, heat of combustion, forms of sulfur, ash-fusion temperatures and free-swelling index of 12 coal samples from Maryland.

[All values are in percent except Btu/lb, ash-fusion temperatures, and free-swelling index and are reported on the as-received basis. °F = 9/5°C + 32; Kcal/kg = 0.556 (Btu/lb).]

	Arithmetic mean	Observed range Minimum	Observed range Maximum	Geometric mean	Geometric deviation	Geometric mean 548 samples
Proximate and ultimate analyses						
Moisture	3.0	0.6	22	1.5	2.6	2.5
Volatile matter	20.9	13.6	27.2	20.5	1.2	28.1
Fixed carbon	58.9	48.8	66.7	58.6	1.1	54.7
Ash	17.2	7.6	29.3	15.4	1.7	9.7
Hydrogen	4.4	3.7	4.9	4.4	1.1	4.9
Carbon	68.2	52.9	80.4	67.7	1.1	71.8
Nitrogen	1.2	.8	1.5	1.2	1.2	1.3
Oxygen	6.7	3.0	32	5.1	1.8	7.1
Sulfur	2.2	.4	3.3	2.0	1.8	1.4
Heat of combustion						
Btu/lb	12040	8480	14310	11920	1.2	12730
Forms of sulfur						
Sulfate	.04	.01	.14	.03	2.7	.04
Pyritic	1.7	.10	3.0	1.3	2.6	.62
Organic	.52	.29	.87	.50	1.4	.76
Ash-fusion temperature °C						
Initial deformation	1340	1060	1510	1340	1.1	1260
Softening temperature	1400	1120	1540	1400	1.1	1300
Fluid temperature	1440	1180	1540	1440	1.1	1360
Free-swelling Index	7.3	4.0	9.0	7.8	1.3	5.6

Table 7b.--Arithmetic mean, observed range, geometric mean, and geometric deviation of ash content and contents of eleven major and minor oxides in the laboratory ash of 25 coal samples from Maryland.

[All samples were ashed at 525°C; all data except geometric deviation are in percent.]

Oxide	Arithmetic mean	Observed range		Geometric mean	Geometric deviation	Geometric mean 644 samples
		Minimum	Maximum			
(Ash)	18	3.7	29.7	15.3	1.9	9.76
SiO_2	46	30	58	45	1.2	43
Al_2O_3	24	16	30	23	1.2	24
CaO	1.5	.43	6.3	1.1	2.0	1.4
MgO	.73	.36	1.3	.68	1.5	.68
Na_2O	.29	.05	1.5	.21	2.1	.34
K_2O	2.0	.54	2.9	1.8	1.7	1.6
Fe_2O_3	17	6.3	41	14	1.8	11
MnO	.02	.003	.11	.01	2.7	.02
TiO_2	1.4	.77	2.0	1.3	1.3	1.1
P_2O_5	.30	.08	.76	.23	2.1	.13
SO_3	2.2	.4	9.8	1.5	2.4	1.7

Table 7c.--Arithmetic mean, observed range, geometric mean, and geometric deviation of 38 elements in 25 coal samples from Maryland.

[All data are in parts per million and are reported on a whole-coal basis; L means less than value shown.]

Element	Arithmetic mean	Observed range		Geometric mean	Geometric deviation	Geometric mean 644 samples
		Minimum	Maximum			
Ag	0.08	0.04L	0.23	0.06	1.8	0.03
As	22	2.0	90	15	2.7	8.4
B	11	.56	26	7.0	3.5	14
Ba	64	7.3	160	43	2.9	48
Be	1.9	.22	3.3	1.6	2.0	1.9
Cd	.13	.04	.35	.11	1.9	.07
Ce	29	11	54	27	1.6	16
Co	10	4.1	20	9.2	1.7	6.2
Cr	30	12	44	28	1.5	14
Cs	1.8	.2	3.1	1.5	2.2	.66
Cu	21	3.7	56	18	2.0	15
Eu	.57	.23	.96	.54	1.4	.33
F	91	26L	210	66	2.2	51
Ga	9.3	1.4	18	7.7	2.1	4.8
Ge	5.2	1.2L	13	2.2	3.2	1.1
Hf	1.3	.5	2.3	1.2	1.7	.61
Hg	.59	.05	1.6	.43	2.4	.12
La	16	5.0	27	14	1.6	8.8
Li	33	5.9	95	22	2.7	15
Lu	.21	.1	.4	.20	1.5	.15
Mn	17	2.0	47	11	2.7	14
Mo	3.0	.44	5.3	2.4	2.2	1.5
Nb	2.5	.30	5.6	1.9	2.4	1.4
Nd	9.2	4.7L	22	2.6	2.7	4.2
Ni	16	2.6	28	14	1.8	12
Pb	12	1.7	24	9.6	2.0	7.0
Sb	.84	.2	1.8	.69	2.0	.73
Sc	6.6	2.5	12	6.0	1.5	3.3
Se	4.6	1.1	14	3.5	2.1	2.8
Sm	2.7	1.1	4.7	2.6	1.5	1.6
Sr	94	14	400	64	2.5	65
Tb	.44	.2	.9	.41	1.5	.26
U	1.9	.8	3.2	1.7	1.6	1.3
V	27	3.7	56	21	2.3	16
Y	6.1	1.1	16	5.2	1.8	6.2
Yb	1.3	.5	2.3	1.2	1.5	.84
Zn	36	8.9	94	31	1.8	14
Zr	19	2.8	45	15	2.3	13

Three of the elements have about equal mean values, whereas, many of the other 29 elements are significantly higher (>50 percent) in the Maryland coal compared with the 644 bituminous coal samples of this report.

Table 7d.--Descriptions for 25 bituminous coal samples from Maryland.

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w193853	Maryland	Garrett	393522n	791713w	Freeport	Upper Freeport	Channel	
w193854	Maryland	Garrett	393522n	791713w	Freeport	No Data Entered	Channel	
w193855	Maryland	Garrett	393628n	791609w	Freeport	Upper Freeport	Channel	22.0
w193856	Maryland	Garrett	393434n	791730w	Freeport	Upper Freeport	Channel	
w193857	Maryland	Garrett	393733n	792735w	Freeport	Upper Freeport	Channel	
w194466	Maryland	Garrett	392705n	791049w	Kittanning	Kittanning	Channel	43.0
w194467	Maryland	Garrett	392408n	792652w	Kittanning	Kittanning	Channel	28.0
w194468	Maryland	Garrett	393745n	792802w	Glenshaw	Bakerstown	Channel	23.0
w194469	Maryland	Garrett	393916n	792726w	Glenshaw	Brush Creek	Channel	20.0
w194471	Maryland	Garrett	393305n	791738w	Freeport	Upper Freeport	Channel	74.0
w194472	Maryland	Garrett	393625n	791612w	Freeport	Upper Freeport	Channel	20.0
w194473	Maryland	Garrett	393253n	791706w	Freeport	Upper Freeport	Channel	20.0
w194474	Maryland	Garrett	393454n	791702w	Glenshaw	Bakerstown	Channel	28.0
w195560	Maryland	Garrett	392705n	791049w	Kittanning	Kittanning	Channel	24.0
w195561	Maryland	Garrett	392705n	791049w	Kittanning	Kittanning	Channel	18.0
w195562	Maryland	Garrett	392705n	791049w	Kittanning	Kittanning	Channel	26.0
w195563	Maryland	Garrett	392408n	792652w	Glenshaw	Bakerstown	Channel	22.0
w195564	Maryland	Garrett	392408n	792652w	Glenshaw	Bakerstown	Channel	15.0
w195565	Maryland	Garrett	393916n	792726w	Glenshaw	Brush Creek	Channel	24.0
w195566	Maryland	Garrett	393916n	792726w	Glenshaw	Brush Creek	Channel	22.0
w195567	Maryland	Garrett	393916n	792726w	Glenshaw	Brush Creek	Channel	18.0
w195568	Maryland	Garrett	393454n	791702w	Freeport	Upper Freeport	Channel	21.0
w195569	Maryland	Garrett	393454n	791702w	Freeport	Upper Freeport	Channel	26.0
w195570	Maryland	Garrett	393454n	791702w	Freeport	Upper Freeport	Channel	22.0
w195571	Maryland	Garrett	393454n	791702w	Freeport	Upper Freeport	Channel	18.0

Table 7e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 12 bituminous coal samples from Maryland.

[All analyses except Kcal/kg, Btu, free-swelling index and ash-fusion temperatures in percent. For each sample number, the analyses are reported three ways; first, as-received, second, moisture free, and third, moisture and ash free. All analyses by Coal Analysis Section, Department of Energy, Pittsburgh, Pa. B, not determined. 1600G for ash-fusion temperatures means greater than 1600 C.]

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w193853	1.3	23.3	66.7	8.7	4.9	78.5	1.4	3.9	2.6	7,800	14,040
	---	23.6	67.6	8.8	4.8	79.5	1.4	2.8	2.6	7,900	14,220
	---	25.9	74.1	---	5.3	87.2	1.6	3.0	2.9	8,660	15,600
w193855	1.3	25.4	65.7	7.6	4.9	80.4	1.5	4.3	1.3	7,950	14,310
	---	25.7	66.6	7.7	4.8	81.5	1.5	3.2	1.3	8,050	14,500
	---	27.9	72.1	---	5.2	88.3	1.6	3.5	1.4	8,730	15,710
w193856	2.9	20.7	55.5	20.9	4.2	65.4	1.1	6.1	2.2	6,440	11,590
	---	21.3	57.2	21.5	4.0	67.4	1.1	3.6	2.3	6,630	11,940
	---	27.2	72.8	---	5.1	85.8	1.4	4.6	2.9	8,450	15,220
w193857	1.5	27.2	63.1	8.2	4.9	78.3	1.4	4.4	2.8	7,810	14,060
	---	27.6	64.1	8.3	4.8	79.5	1.4	3.1	2.8	7,930	14,270
	---	30.1	69.9	---	5.2	86.7	1.6	3.4	3.1	8,650	15,570
w194466	22.2	13.6	55.5	8.7	4.8	52.9	1.1	32.2	.4	4,710	8,480
	---	17.5	71.3	11.2	3.0	68.0	1.4	16.0	.5	6,050	10,900
	---	19.7	80.3	---	3.4	76.6	1.6	18.0	.6	6,820	12,270
w194467	.8	15.7	60.8	22.7	3.7	66.3	1.0	3.0	3.3	6,450	11,610
	---	15.8	61.3	22.9	3.6	66.8	1.0	2.3	3.3	6,500	11,710
	---	20.5	79.5	---	4.7	86.7	1.3	3.0	4.3	8,430	15,180
w194468	1.7	20.2	48.8	29.3	3.8	57.4	.8	5.5	3.2	5,630	10,140
	---	20.5	49.6	29.8	3.7	58.4	.8	4.1	3.3	5,730	10,310
	---	29.3	70.7	---	5.2	83.2	1.2	5.8	4.6	8,160	14,690
w194469	1.0	21.7	51.8	25.5	4.0	62.0	1.1	5.3	2.1	6,140	11,060
	---	21.9	52.3	25.8	3.9	62.6	1.1	4.5	2.1	6,210	11,170
	---	29.5	70.5	---	5.3	84.4	1.5	6.0	2.9	8,360	15,040
w194471	.6	18.6	55.4	25.4	3.9	63.1	1.3	3.4	3.1	6,230	11,220
	---	18.7	55.7	25.6	3.9	63.5	1.3	2.9	3.1	6,270	11,280
	---	25.1	74.9	---	5.2	85.3	1.8	3.9	4.2	8,420	15,160
w194472	.8	22.1	56.1	21.0	4.4	67.4	1.2	3.6	2.4	6,670	12,000
	---	22.3	56.6	21.2	4.3	67.9	1.2	2.9	2.4	6,720	12,090
	---	28.3	71.7	---	5.5	86.2	1.5	3.7	3.1	8,520	15,340
w194473	.9	20.2	60.5	18.4	4.2	70.1	1.3	4.9	1.2	6,880	12,380
	---	20.4	61.0	18.6	4.1	70.7	1.3	4.1	1.2	6,940	12,500
	---	25.0	75.0	---	5.1	86.9	1.6	5.1	1.5	8,530	15,350

Table 7e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 12 bituminous coal samples from Maryland--continued

Sample number	Air-dried loss	Forms of sulfur: Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C: Initial deform.	soften.	fluid
w193853	0.7	0.06	2.16	0.42	9.0	1,235	1,295	1,360
	---	.06	2.19	.43				
	---	.07	2.40	.47				
w193855	.5	.03	.64	.66	9.0	1,475	1,540	1,540
	---	.03	.65	.67				
	---	.03	.70	.72				
w193856	2.0	.14	1.70	.35	8.0	1,425	1,485	1,540
	---	.14	1.75	.36				
	---	.18	2.23	.46				
w193857	.7	.04	2.08	.67	9.0	1,065	1,120	1,175
	---	.04	2.11	.68				
	---	.04	2.30	.74				
w194466	13.0	.01	.10	.29	.0	1,345	1,400	1,455
	---	.01	.13	.37				
	---	.01	.14	.42				
w194467	.1	.01	2.97	.35	4.0	1,375	1,430	1,480
	---	.01	2.99	.35				
	---	.01	3.88	.46				
w194468	.5	.12	2.50	.54	5.0	1,405	1,455	1,505
	---	.12	2.54	.55				
	---	.17	3.62	.78				
w194469	.0	.03	1.16	.87	9.0	1,345	1,405	1,455
	---	.03	1.17	.88				
	---	.04	1.58	1.18				
w194471	.1	.01	2.62	.43	8.0	1,370	1,430	1,480
	---	.01	2.64	.43				
	---	.01	3.54	.58				
w194472	.1	.01	1.94	.45	9.0	1,325	1,380	1,435
	---	.01	1.96	.45				
	---	.01	2.48	.58				
w194473	.1	.01	.56	.59	9.0	1,515	1,540	1,540
	---	.01	.57	.60				
	---	.01	.69	.73				

Table 7e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 12 bituminous coal samples from Maryland--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
W194474	1.1	21.8	66.6	10.5	4.8	76.6	1.5	4.2	2.4	7,560	13,610
	---	22.0	67.3	10.6	4.7	77.5	1.5	3.3	2.4	7,640	13,760
	---	24.7	75.3	---	5.3	86.7	1.7	3.6	2.7	8,550	15,390

Table 7e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 12 bituminous coal samples from Maryland--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
W194474	0.2	0.03	1.69	0.68	9.0	1,265	1,320	1,370
	---	.03	1.71	.69				
	---	.03	1.91	.77				

Table 7f.--Major and minor oxide and trace element compostion of the laboratory ash of 25 bituminous coal samples from Maryland.

[Values in percent or parts-per-million. Coal ashed at 525 C. L means less than the value shown; N, not detected; B, not determined; S after element title indicates determinations by automatic plate reading computer assisted, emission spectographic analyses. The standard deviation of any single answer should be taken as plus 50% and minus 35%. Methods of analyses for other elements as shown in figure 1.]

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w193853	10.4	30	19	1.4	0.41	0.19	1.0	41	0.77	0.12	w193853
w193854	20.4	46	21	.94	.65	.20	2.5	24	1.3	.41	w193854
w193855	8.0	48	27	1.8	.66	.31	2.2	12	1.3	.32	w193855
w193856	27.9	58	27	.61	.68	.16	2.0	11	2.0	.12	w193856
w193857	9.5	33	16	1.7	.36	.23	.85	40	1.0	.10	w193857
w194466	8.9	34	30	6.3	1.3	.15	2.3	6.8	1.3	.43	w194466
w194467	23.3	47	25	.53	.73	.17	2.5	14	1.8	.08	w194467
w194468	29.7	47	28	.43	.85	.18	2.6	14	1.5	.17	w194468
w194469	22.5	54	20	.93	1.3	.24	2.7	12	1.2	.17	w194469
w194471	3.7	41	21	1.8	.65	1.5	.54	23	1.1	.76	w194471
w194472	26.9	53	29	.94	.73	.20	2.9	6.3	1.4	.63	w194472
w194473	14.4	51	23	.72	.66	.28	2.6	12	1.4	.38	w194473
w194474	28.2	58	23	.88	.45	.05	1.6	8.5	1.9	.19	w194474
w195560	B	B	B	B	B	B	B	B	B	B	w195560
w195561	B	B	B	B	B	B	B	B	B	B	w195561
w195562	B	B	B	B	B	B	B	B	B	B	w195562
w195563	B	B	B	B	B	B	B	B	B	B	w195563
w195564	B	B	B	B	B	B	B	B	B	B	w195564
w195565	B	B	B	B	B	B	B	B	B	B	w195565
w195566	B	B	B	B	B	B	B	B	B	B	w195566
w195567	B	B	B	B	B	B	B	B	B	B	w195567
w195568	B	B	B	B	B	B	B	B	B	B	w195568
w195569	B	B	B	B	B	B	B	B	B	B	w195569
w195570	B	B	B	B	B	B	B	B	B	B	w195570
w195571	B	B	B	B	B	B	B	B	B	B	w195571

Table 7f.--Major and minor oxide and trace element compostion of the laboratory ash of 25 bituminous coal samples from Maryland--continued

Sample number	SO3 (percent)	Ag-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w193853	2.0	0.70	10	95	15	0.60	120	63	120	4.8	w193853
w193854	1.2	.30	55	330	13	.38	130	49	210	10	w193854
w193855	3.2	.50	83	240	27	.98	170	61	170	8.8	w193855
w193856	.80	.30	93	160	12	.44	130	33	150	8.2	w193856
w193857	2.6	1.0	15	77	27	.89	120	210	140	2.1	w193857
w194466	9.8	.40	70	950	10	3.9	200	69	220	9.0	w194466
w194467	.57	.30	44	330	8.0	.23	150	59	150	12	w194467
w194468	.76	.30	59	340	9.0	.52	180	51	150	10	w194468
w194469	2.0	.10L	72	460	6.0	.74	120	21	120	10	w194469
w194471	2.9	.10L	15	200	6.0	.96	1,100	140	890	38	w194471
w194472	1.0	.30	68	610	10	.34	130	63	150	8.6	w194472
w194473	1.0	.50	57	490	9.0	.94	260	65	230	17	w194473
w194474	.40	.80	81	270	4.0	.92	43	21	43	.7	w194474
w195560	B	B	B	B	B	B	B	B	B	B	w195560
w195561	B	B	B	B	B	B	B	B	B	B	w195561
w195562	B	B	B	B	B	B	B	B	B	B	w195562
w195563	B	B	B	B	B	B	B	B	B	B	w195563
w195564	B	B	B	B	B	B	B	B	B	B	w195564
w195565	B	B	B	B	B	B	B	B	B	B	w195565
w195566	B	B	B	B	B	B	B	B	B	B	w195566
w195567	B	B	B	B	B	B	B	B	B	B	w195567
w195568	B	B	B	B	B	B	B	B	B	B	w195568
w195569	B	B	B	B	B	B	B	B	B	B	w195569
w195570	B	B	B	B	B	B	B	B	B	B	w195570
w195571	B	B	B	B	B	B	B	B	B	B	w195571

Table 7f.--Major and minor oxide and trace element compostion of the laboratory ash of 25 bituminous coal samples from Maryland--continued

Sample number	Cu (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Sample number
w193853	120	3.2	41	15	65	4.8	67	97	1	42	w193853
w193854	79	2.5	68	7.0L	21	6.4	69	100	1	34	w193854
w193855	140	3.9	60	8.0	160	7.5	100	110	1	25	w193855
w193856	96	2.5	52	7.0L	17	7.9	72	340	1	52	w193856
w193857	96	3.8	58	20	84	5.3	53	62	1	34	w193857
w194466	150	5.2	48	18	2.0L	7.9	100	80	2	440	w194466
w194467	120	2.6	53	14	5.0	7.7	77	200	.9	68	w194467
w194468	190	3.2	59	10	13	7.1	88	310	1	70	w194468
w194469	74	2.3	44	7.0L	2.0L	5.8	62	210	.9	210	w194469
w194471	100	17	37	13	2.0L	62	680	200	5	880	w194471
w194472	98	2.8	58	13	5.0	5.6	71	150	1	42	w194472
w194473	150	5.0	51	12	27	9.0	140	160	1	39	w194473
w194474	130	.82	35	7.0L	2.0L	1.8	21	110	.4	53	w194474
w195560	B	B	B	B	B	B	B	B	B	B	w195560
w195561	B	B	B	B	B	B	B	B	B	B	w195561
w195562	B	B	B	B	B	B	B	B	B	B	w195562
w195563	B	B	B	B	B	B	B	B	B	B	w195563
w195564	B	B	B	B	B	B	B	B	B	B	w195564
w195565	B	B	B	B	B	B	B	B	B	B	w195565
w195566	B	B	B	B	B	B	B	B	B	B	w195566
w195567	B	B	B	B	B	B	B	B	B	B	w195567
w195568	B	B	B	B	B	B	B	B	B	B	w195568
w195569	B	B	B	B	B	B	B	B	B	B	w195569
w195570	B	B	B	B	B	B	B	B	B	B	w195570
w195571	B	B	B	B	B	B	B	B	B	B	w195571

Table 7f.--Major and minor oxide and trace element compostion of the laboratory ash of 25 bituminous coal samples from Maryland--continued

Sample number	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sample number
w193853	51	5	47	81	72	68L	220	24	13	7.0	w193853
w193854	16	10	46L	83	52	68L	2	41	11	7.0L	w193854
w193855	40	13	59	210	68	68L	270L	36	18	7.0L	w193855
w193856	17	20	46L	50	74	68L	100	33	11	9.0	w193856
w193857	49	15	53	300	220	75	230L	41	14	9.0	w193857
w194466	5.0	13	46L	120	62	68L	400L	52	25	6.0	w194466
w194467	6.0	20	46L	110	51	68L	230L	34	12	2.0L	w194467
w194468	11	13	46L	78	81	68L	160	41	16	2.0L	w194468
w194469	5.0	11	46L	61	35	68L	210L	25	11	2.0L	w194469
w194471	24	8	46L	71	46	68L	1,400L	190	84	2.0L	w194471
w194472	15	12	82	79	49	68L	170	29	13	3.0	w194472
w194473	14	11	46L	82	62	68L	370L	46	24	2.0L	w194473
w194474	15	18	46L	50	47	68L	120L	11	3.9	3.0	w194474
w195560	B	B	B	B	B	B	B	B	B	B	w195560
w195561	B	B	B	B	B	B	B	B	B	B	w195561
w195562	B	B	B	B	B	B	B	B	B	B	w195562
w195563	B	B	B	B	B	B	B	B	B	B	w195563
w195564	B	B	B	B	B	B	B	B	B	B	w195564
w195565	B	B	B	B	B	B	B	B	B	B	w195565
w195566	B	B	B	B	B	B	B	B	B	B	w195566
w195567	B	B	B	B	B	B	B	B	B	B	w195567
w195568	B	B	B	B	B	B	B	B	B	B	w195568
w195569	B	B	B	B	B	B	B	B	B	B	w195569
w195570	B	B	B	B	B	B	B	B	B	B	w195570
w195571	B	B	B	B	B	B	B	B	B	B	w195571

Table 7f.--Major and minor oxide and trace element compostion of the laboratory ash of 25 bituminous coal samples from Maryland--continued

Sample number	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	U (ppm)	V-S (ppm)	W-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Sample number
w193853	150	3.8	29L	10L	7.7	86	10L	38	6.7	250	w193853
w193854	440	2.5	20	10L	9.3	140	10	21	5.9	180	w193854
w193855	620	3.8	38L	14	11	160	10L	61	10	280	w193855
w193856	180	2.2	11L	10L	9.7	160	10L	20	5.4	77	w193856
w193857	290	2.1	32L	10L	8.4	110	10L	54	7.4	620	w193857
w194466	1,300	4.5	34L	3.0L	15	120	10L	66	12	590	w194466
w194467	230	1.7	13L	3.0L	9.4	160	10L	45	6.4	72	w194467
w194468	280	3.0	10L	3.0L	11	160	10L	22	7.7	100	w194468
w194469	580	1.3	13L	3.0L	8.0	110	10L	18	4.9	170	w194469
w194471	380	11	81L	3.0L	76	100	10L	30	43	240	w194471
w194472	1,500	1.9	11L	3.0L	8.6	210	10L	61	6.7	350	w194472
w194473	820	2.8	21L	3.0L	14	160	10L	30	11	230	w194473
w194474	260	.71	11L	3.0L	7.1	150	10L	22	1.8	110	w194474
w195560	B	B	B	B	B	B	B	B	B	B	w195560
w195561	B	B	B	B	B	B	B	B	B	B	w195561
w195562	B	B	B	B	B	B	B	B	B	B	w195562
w195563	B	B	B	B	B	B	B	B	B	B	w195563
w195564	B	B	B	B	B	B	B	B	B	B	w195564
w195565	B	B	B	B	B	B	B	B	B	B	w195565
w195566	B	B	B	B	B	B	B	B	B	B	w195566
w195567	B	B	B	B	B	B	B	B	B	B	w195567
w195568	B	B	B	B	B	B	B	B	B	B	w195568
w195569	B	B	B	B	B	B	B	B	B	B	w195569
w195570	B	B	B	B	B	B	B	B	B	B	w195570
w195571	B	B	B	B	B	B	B	B	B	B	w195571

Table 7f.--Major and minor oxide and trace element compostion of the laboratory ash of 25 bituminous coal samples from Maryland--continued

Sample number	Zr-S (ppm)
w193853	63
w193854	56
w193855	69
w193856	83
w193857	91
w194466	190
w194467	180
w194468	91
w194469	85
w194471	76
w194472	100
w194473	97
w194474	160
w195560	B
w195561	B
w195562	B
w195563	B
w195564	B
w195565	B
w195566	B
w195567	B
w195568	B
w195569	B
w195570	B
w195571	B

Table 7g.--Content of 22 trace elements in 25 bituminous coal samples from Maryland.

[Analysis performed on whole-coal. Values in parts-per-million (ppm). L, less than the value shown; B, not determined.]

Sample number	As (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	La (ppm)	Sample number
w193853	90	13	6.5	13	0.5	0.33	32	0.5	0.53	7	w193853
w193854	65	27	9.9	43	2.1	.50	120	1.3	.59	14	w193854
w193855	12	14	4.9	14	.7	.31	37	.6	.20	8	w193855
w193856	14	36	9.2	42	2.3	.71	120	2.2	.34	20	w193856
w193857	52	11	20	13	.2	.36	26	.5	.76	5	w193857
w194466	2.0	18	6.1	20	.8	.46	44	.7	1.6	9	w194466
w194467	12	34	14	35	2.8	.60	100	1.8	1.2	18	w194467
w194468	24	54	15	44	3.1	.96	150	2.1	1.3	26	w194468
w194469	10	26	4.7	26	2.3	.52	100	1.3	.26	14	w194469
w194471	14	42	5.0	33	1.4	.63	20L	2.3	.20	25	w194471
w194472	31	36	17	40	2.3	.75	120	1.5	.37	19	w194472
w194473	10	37	9.3	33	2.4	.72	210	1.3	.050	20	w194473
w194474	14	12	5.9	12	.2	.23	34	.5	.15	6	w194474
w195560	2.0	13	5.2	15	.5	.37	B	.5	.80	7	w195560
w195561	11	36	9.6	34	2.3	.68	B	1.3	.19	19	w195561
w195562	31	35	17	41	2.3	.71	B	1.5	.33	20	w195562
w195563	27	50	15	44	2.6	.89	B	2.0	1.1	27	w195563
w195564	11	36	9.5	33	2.0	.65	B	1.3	.17	19	w195564
w195565	41	32	17	37	2.1	.65	B	1.4	.33	18	w195565
w195566	15	28	16	33	2.2	.51	B	1.7	1.1	16	w195566
w195567	10	26	4.7	26	2.3	.47	B	1.4	.31	14	w195567
w195568	9.0	24	4.1	25	1.9	.42	B	1.2	.13	13	w195568
w195569	31	49	17	38	2.4	.85	B	2.0	.88	26	w195569
w195570	15	29	14	32	2.2	.51	B	1.7	.95	17	w195570
w195571	2.0	17	5.3	22	.9	.40	B	.7	1.0	10	w195571

Table 7g.--Content of 22 trace elements in 25 bituminous coal samples from Maryland--continued

Sample number	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Th (ppm)	Sample number
w193853	0.1	150	55	23	1.5	2.5	2.5	1.3	0.4	3.0L	w193853
w193854	.2	300	370		1.6	8.3	2.8	2.3	.5	4.0	w193854
w193855	.1	180	110	22L	1.0	2.9	1.4	1.4	.3	3.0L	w193855
w193856	.3	330	150	29	.90	9.1	4.8	3.0	.6	3.0L	w193856
w193857	.1	160	42	22L	1.8	3.9	2.0	1.3	.2	3.0L	w193857
w194466	.2	99	170	36L	.20	4.6	1.2	2.2	.4	3.0L	w194466
w194467	.2	290	81	53L	.60	7.9	6.2	2.8	.4	3.0L	w194467
w194468	.4	400	220	48	1.3	12	11	4.7	.9	3.0L	w194468
w194469	.2	400	170	48L	.40	5.6	3.1	2.5	.3	3.0L	w194469
w194471	.2	400	120	51L	.50	7.2	5.5	3.1	.4	3.0L	w194471
w194472	.3	400	740	45	1.1	7.7	4.6	3.4	.5	3.0L	w194472
w194473	.2	300	240	54L	.70	6.6	1.5	3.4	.4	3.0L	w194473
w194474	.1	100	230	33L	.30	3.1	4.0	1.1	.2	3.0L	w194474
w195560	.1	B	B	34L	.20	3.6	1.2	1.8	.3	B	w195560
w195561	.2	B	B	56L	.70	6.4	1.8	3.4	.5	B	w195561
w195562	.3	B	B	62L	1.1	7.6	5.1	3.5	.6	B	w195562
w195563	.3	B	B	67L	1.3	12	11	4.6	.7	B	w195563
w195564	.2	B	B	53L	.70	6.1	2.0	3.3	.5	B	w195564
w195565	.3	B	B	51L	1.1	7.1	4.9	3.2	.5	B	w195565
w195566	.2	B	B	54L	.70	7.0	8.8	2.5	.3	B	w195566
w195567	.2	B	B	46	.40	5.8	3.0	2.4	.3	B	w195567
w195568	.2	B	B	50L	.40	4.8	3.0	2.3	.4	B	w195568
w195569	.3	B	B	53L	1.6	11	14	4.5	.8	B	w195569
w195570	.2	B	B	51L	.70	7.0	8.1	2.5	.4	B	w195570
w195571	.2	B	B	16	.20	4.2	1.1	2.0	.3	B	w195571

Table 7g.--Content of 22 trace elements in 25 bituminous coal samples from Maryland--continued

Sample number	U (ppm)	Yb (ppm)
w193853	0.80	0.7
w193854	1.9	1.2
w193855	.90	.8
w193856	2.7	1.5
w193857	.80	.7
w194466	1.3	1.1
w194467	2.2	1.5
w194468	3.2	2.3
w194469	1.8	1.1
w194471	2.8	1.6
w194472	2.3	1.8
w194473	2.0	1.6
w194474	2.0	.5
w195560	B	.8
w195561	B	1.3
w195562	B	1.5
w195563	B	1.8
w195564	B	1.2
w195565	B	1.4
w195566	B	1.1
w195567	B	1.0
w195568	B	.8
w195569	B	2.0
w195570	B	1.2
w195571	B	.8

Table 7h.--Major, minor, and trace element composition of 25 bituminous coal samples from Maryland reported on whole-coal basis.

[Values in percent or parts-per-million. 22 values are from direct determinations on whole-coal; all other values calculated from analyses of ash. S means analysis by emission spectography; L, less than the value shown; N, not detected; B, not determined.]

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
W193853	1.5	1.0	0.10	0.026	0.015	0.087	3.0	0.048	0.07	90	W193853
W193854	4.4	2.3	.14	.080	.030	.42	3.4	.16	.06	65	W193854
W193855	1.8	1.1	.10	.032	.018	.15	.67	.062	.04	12	W193855
W193856	7.6	4.0	.12	.11	.033	.46	2.1	.33	.08	14	W193856
W193857	1.5	.80	.12	.021	.016	.067	2.7	.057	.10	52	W193857
W194466	1.4	1.4	.40	.071	.010	.17	.42	.069	.04	2.0	W194466
W194467	5.1	3.1	.088	.10	.029	.49	2.3	.25	.07	12	W194467
W194468	6.5	4.4	.091	.15	.040	.64	2.9	.27	.09	24	W194468
W194469	5.7	2.4	.15	.18	.040	.51	1.9	.16	.02L	10	W194469
W194471	.71	.41	.048	.014	.040	.017	.59	.024	.00L	14	W194471
W194472	6.7	4.1	.18	.12	.040	.65	1.2	.23	.08	31	W194472
W194473	3.4	1.8	.074	.057	.030	.31	1.2	.12	.07	10	W194473
W194474	7.6	3.4	.18	.076	.010	.38	1.7	.32	.23	14	W194474
W195560	B	B	B	B	B	B	B	B	B	2.0	W195560
W195561	B	B	B	B	B	B	B	B	B	11	W195561
W195562	B	B	B	B	B	B	B	B	B	31	W195562
W195563	B	B	B	B	B	B	B	B	B	27	W195563
W195564	B	B	B	B	B	B	B	B	B	11	W195564
W195565	B	B	B	B	B	B	B	B	B	41	W195565
W195566	B	B	B	B	B	B	B	B	B	15	W195566
W195567	B	B	B	B	B	B	B	B	B	10	W195567
W195568	B	B	B	B	B	B	B	B	B	9.0	W195568
W195569	B	B	B	B	B	B	B	B	B	31	W195569
W195570	B	B	B	B	B	B	B	B	B	15	W195570
W195571	B	B	B	B	B	B	B	B	B	2.0	W195571

Table 7h.--Major, minor, and trace element composition of 25 bituminous coal samples from Maryland reported on whole-coal basis--continued

Sample number	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Eu (ppm)	Sample number
w193853	1.0	10	1.6	0.06	13	6.5	13	0.5	12	0.33	w193853
w193854	11	67	2.7	.08	27	9.9	43	2.1	16	.50	w193854
w193855	6.6	19	2.2	.08	14	4.9	14	.7	11	.31	w193855
w193856	26	45	3.3	.12	36	9.2	42	2.3	27	.71	w193856
w193857	1.4	7	2.6	.08	11	20	13	.2	9.1	.36	w193857
w194466	6.2	85	.9	.35	18	6.1	20	.8	13	.46	w194466
w194467	10	77	1.9	.05	34	14	35	2.8	28	.60	w194467
w194468	18	100	2.7	.15	54	15	44	3.1	56	.96	w194468
w194469	16	100	1.4	.17	26	4.7	26	2.3	17	.52	w194469
w194471	.6	7	.2	.04	42	5.0	33	1.4	3.7	.63	w194471
w194472	18	160	2.7	.09	36	17	40	2.3	26	.75	w194472
w194473	8.2	71	1.3	.14	37	9.3	33	2.4	22	.72	w194473
w194474	23	76	1.1	.26	12	5.9	12	.2	37	.23	w194474
w195560	B	B	B	B	13	5.2	15	.5	B	.37	w195560
w195561	B	B	B	B	36	9.6	34	2.3	B	.68	w195561
w195562	B	B	B	B	35	17	41	2.3	B	.71	w195562
w195563	B	B	B	B	50	15	44	2.6	B	.89	w195563
w195564	B	B	B	B	36	9.5	33	2.0	B	.65	w195564
w195565	B	B	B	B	32	17	37	2.1	B	.65	w195565
w195566	B	B	B	B	28	16	33	2.2	B	.51	w195566
w195567	B	B	B	B	26	4.7	26	2.3	B	.47	w195567
w195568	B	B	B	B	24	4.1	25	1.9	B	.42	w195568
w195569	B	B	B	B	49	17	38	2.4	B	.85	w195569
w195570	B	B	B	B	29	14	32	2.2	B	.51	w195570
w195571	B	B	B	B	17	5.3	22	.9	B	.40	w195571

Table 7h.--Major, minor, and trace element composition of 25 bituminous coal samples from Maryland reported on whole-coal basis--continued

Sample number	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Sample number
w193853	32	4.3	1.6	6.8	0.5	0.53	7	10	0.1	4.4	w193853
w193854	120	14	1.4L	4.3	1.3	.59	14	20	.2	6.9	w193854
w193855	37	4.8	.64	13	.6	.20	8	8.8	.1	2.0	w193855
w193856	120	15	2.0L	4.7	2.2	.34	20	95	.3	15	w193856
w193857	26	5.5	1.9	8.0	.5	.76	5	5.9	.1	3.2	w193857
w194466	44	4.3	1.6	.18L	.7	1.6	9	7.1	.2	39	w194466
w194467	100	12	3.3	1.2	1.8	1.2	18	47	.2	16	w194467
w194468	150	18	3.0	3.9	2.1	1.3	26	92	.4	21	w194468
w194469	100	9.9	1.6L	.45L	1.3	.26	14	47	.2	47	w194469
w194471	20L	1.4	.48	.07L	2.3	.20	25	7.4	.2	33	w194471
w194472	120	16	3.5	1.3	1.5	.37	19	40	.3	11	w194472
w194473	210	7.3	1.7	3.9	1.3	.050	20	23	.2	5.6	w194473
w194474	34	9.9	2.0L	.56L	.5	.15	6	31	.1	15	w194474
w195560	B	B	B	B	.5	.80	7	B	.1	B	w195560
w195561	B	B	B	B	1.3	.19	19	B	.2	B	w195561
w195562	B	B	B	B	1.5	.33	20	B	.3	B	w195562
w195563	B	B	B	B	2.0	1.1	27	B	.3	B	w195563
w195564	B	B	B	B	1.3	.17	19	B	.2	B	w195564
w195565	B	B	B	B	1.4	.33	18	B	.3	B	w195565
w195566	B	B	B	B	1.7	1.1	16	B	.2	B	w195566
w195567	B	B	B	B	1.4	.31	14	B	.2	B	w195567
w195568	B	B	B	B	1.2	.13	13	B	.2	B	w195568
w195569	B	B	B	B	2.0	.88	26	B	.3	B	w195569
w195570	B	B	B	B	1.7	.95	17	B	.2	B	w195570
w195571	B	B	B	B	.7	1.0	10	B	.2	B	w195571

Table 7h.--Major, minor, and trace element composition of 25 bituminous coal samples from Maryland reported on whole-coal basis--continued

Sample number	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	P (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Sample number
w193853	5.3	0.52	4.9	8.4	55	7.5	7.1L	23	1.5	2.5	w193853
w193854	3.3	2.0	9.4L	17	370	11	14L		1.6	8.3	w193854
w193855	3.2	1.0	4.7	17	110	5.4	5.4L	22L	1.0	2.9	w193855
w193856	4.7	5.6	13L	14	150	21	19L	29	.90	9.1	w193856
w193857	4.7	1.4	5.0	29	42	21	7.1	22L	1.8	3.9	w193857
w194466	.45	1.2	4.1L	11	170	5.5	6.1L	36L	.20	4.6	w194466
w194467	1.4	4.7	11L	26	81	12	16L	53L	.60	7.9	w194467
w194468	3.3	3.9	14L	23	220	24	20L	48	1.3	12	w194468
w194469	1.1	2.5	10L	14	170	7.9	15L	48L	.40	5.6	w194469
w194471	.89	.30	1.7L	2.6	120	1.7	2.5L	51L	.50	7.2	w194471
w194472	4.0	3.2	22	21	740	13	18L	45	1.1	7.7	w194472
w194473	2.0	1.6	6.6L	12	240	8.9	9.8L	54L	.70	6.6	w194473
w194474	4.2	5.1	13L	14	230	13	19L	33L	.30	3.1	w194474
w195560	B	B	B	B	B	B	B	34L	.20	3.6	w195560
w195561	B	B	B	B	B	B	B	56L	.70	6.4	w195561
w195562	B	B	B	B	B	B	B	62L	1.1	7.6	w195562
w195563	B	B	B	B	B	B	B	67L	1.3	12	w195563
w195564	B	B	B	B	B	B	B	53L	.70	6.1	w195564
w195565	B	B	B	B	B	B	B	51L	1.1	7.1	w195565
w195566	B	B	B	B	B	B	B	54L	.70	7.0	w195566
w195567	B	B	B	B	B	B	B	46	.40	5.8	w195567
w195568	B	B	B	B	B	B	B	50L	.40	4.8	w195568
w195569	B	B	B	B	B	B	B	53L	1.6	11	w195569
w195570	B	B	B	B	B	B	B	51L	.70	7.0	w195570
w195571	B	B	B	B	B	B	B	16	.20	4.2	w195571

Table 7h.--Major, minor, and trace element composition of 25 bituminous coal samples from Maryland reported on whole-coal basis--continued

Sample number	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	U (ppm)	V-S (ppm)	W-S (ppm)	Sample number
w193853	2.5	1.3	0.73	16	0.4	3.0L	1.0L	0.80	8.9	1.0L	w193853
w193854	2.8	2.3	1.4L	90	.5	4.0	2.0L	1.9	29	2.0	w193854
w193855	1.4	1.4	.56L	50	.3	3.0L	1.1	.90	13	.80L	w193855
w193856	4.8	3.0	2.5	50	.6	3.0L	2.8L	2.7	45	2.8L	w193856
w193857	2.0	1.3	.86	28	.2	3.0L	.95L	.80	10	.95L	w193857
w194466	1.2	2.2	.53	120	.4	3.0L	.27L	1.3	11	.89L	w194466
w194467	6.2	2.8	.47L	54	.4	3.0L	.70L	2.2	37	2.3L	w194467
w194468	11	4.7	.59L	83	.9	3.0L	.89L	3.2	48	3.0L	w194468
w194469	3.1	2.5	.45L	130	.3	3.0L	.68L	1.8	25	2.3L	w194469
w194471	5.5	3.1	.07L	14	.4	3.0L	.11L	2.8	3.7	.37L	w194471
w194472	4.6	3.4	.81	400	.5	3.0L	.81L	2.3	56	2.7L	w194472
w194473	1.5	3.4	.29L	120	.4	3.0L	.43L	2.0	23	1.4L	w194473
w194474	4.0	1.1	.85	73	.2	3.0L	.85L	2.0	42	2.8L	w194474
w195560	1.2	1.8	B	B	.3	B	B	B	B	B	w195560
w195561	1.8	3.4	B	B	.5	B	B	B	B	B	w195561
w195562	5.1	3.5	B	B	.6	B	B	B	B	B	w195562
w195563	11	4.6	B	B	.7	B	B	B	B	B	w195563
w195564	2.0	3.3	B	B	.5	B	B	B	B	B	w195564
w195565	4.9	3.2	B	B	.5	B	B	B	B	B	w195565
w195566	8.8	2.5	B	B	.3	B	B	B	B	B	w195566
w195567	3.0	2.4	B	B	.3	B	B	B	B	B	w195567
w195568	3.0	2.3	B	B	.4	B	B	B	B	B	w195568
w195569	14	4.5	B	B	.8	B	B	B	B	B	w195569
w195570	8.1	2.5	B	B	.4	B	B	B	B	B	w195570
w195571	1.1	2.0	B	B	.3	B	B	B	B	B	w195571

Table 7h.--Major, minor, and trace element composition of 25 bituminous coal samples from Maryland reported on whole-coal basis--continued

Sample number	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)
w193853	4.0	0.7	26	6.6
w193854	4.3	1.2	37	11
w193855	4.9	.8	22	5.5
w193856	5.6	1.5	21	23
w193857	5.1	.7	59	8.6
w194466	5.9	1.1	53	17
w194467	10	1.5	17	42
w194468	6.5	2.3	30	27
w194469	4.1	1.1	38	19
w194471	1.1	1.6	8.9	2.8
w194472	16	1.8	94	27
w194473	4.3	1.6	33	14
w194474	6.2	.5	31	45
w195560	B	.8	B	B
w195561	B	1.3	B	B
w195562	B	1.5	B	B
w195563	B	1.8	B	B
w195564	B	1.2	B	B
w195565	B	1.4	B	B
w195566	B	1.1	B	B
w195567	B	1.0	B	B
w195568	B	.8	B	B
w195569	B	2.0	B	B
w195570	B	1.2	B	B
w195571	B	.8	B	B

Summary of analytical data on 254 West Virginia bituminous coal samples

Data on 49 West Virginia coal samples were reported by Swanson and others (1976) and on 252 samples by Zubovic and others (1979). Distribution of the 254 coal samples of this report is shown on figure 6. The statistical data are presented in tables 8a, b and c; the analytical data in tables 8e, f, g and h. Descriptons and specific locations of the samples are given in table 8d. The 254 samples were collected from 50 different coal beds. The 24 samples from the Sewell bed and 21 samples from the Pocahontas No. 3 bed are the largest number of samples collected from individual beds.

In the following paragraphs the geometric means of the analytical data on West Virginia coal are compared with those of the 644 bituminous coal samples of this report.

Comparison of the geometric means for the proximate and ultimate analysis, (table 8a), does not show significant differences in the two sets of data. Slightly higher mean values for moisture, fixed carbon and carbon, and lower mean values for volatile matter, ash and sulfur are found in West Virginia coal. The means for other components are about equal. The mean values for heat of combustion, ash-fusion temperatures and free-swelling index are higher in the West Virginia coal samples.

Comparison of the geometric means for the major and minor element oxides in ash, (table 8b), also shows similar values in the two sets of data. Only the mean values for Na_2O are significantly higher and Fe_2O_3 lower in the West Virginia coal ash. The geometric means for the trace elements in coal, (table 8c), show that 18 of the elements have similar mean values in the two data sets. Barium, F, Nd and U have higher mean values in the West Virginia coal samples whereas the mean values for As, B, Cr, Cs, Gr, Ge, Hf, Hg, Li, Mn, Mo, Nb, Sc, V, Y, Yb, Zn and Zr are lower.

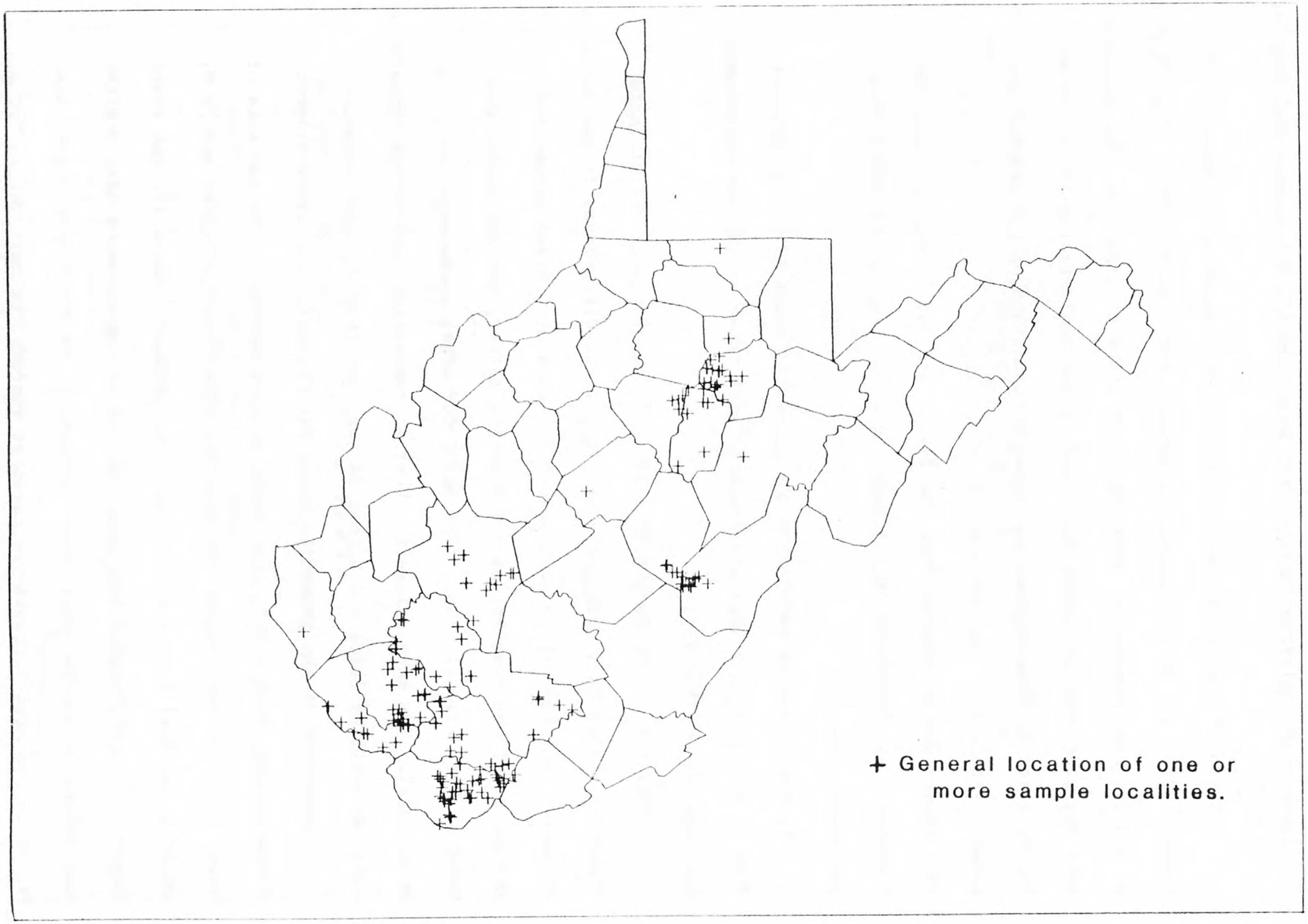

Figure 6.--Distribution of West Virginia bituminous coal samples.

Table 8a.-- Arithmetic mean, observed range, geometric mean, and geometric deviation of proximate and ultimate analyses, heat of combustion, forms of sulfur, ash-fusion temperatures and free-swelling index of 254 coal samples from West Virginia.

[All valves are in percent except Btu/lb, ash-fusion temperatures, free-swelling index and are reported on the as-received basis. °F = 9/5°C + 32; Kcal/kg = 0.556 (Btu/lb)].

	Arithmetic mean	Observed range Minimum	Observed range Maximum	Geometric mean	Geometric deviation	Geometric mean 548 samples
Proximate and ultimate analyses						
Moisture	3.4	0.5	32	2.8	1.7	2.5
Volatile matter	28.2	12.8	43.8	26.8	1.4	28.1
Fixed carbon	59.3	31.5	79.0	58.4	1.2	54.7
Ash	9.18	1.7	47.6	7.64	1.8	9.7
Hydrogen	5.0	2.8	5.9	4.9	1.1	4.9
Carbon	75.3	42.7	86.4	74.9	1.1	71.8
Nitrogen	1.3	.7	1.7	1.3	1.2	1.3
Oxygen	8.1	2.6	40	7.3	1.5	7.1
Sulfur	1.2	.4	5.2	.97	1.8	1.4
Heat of combustion						
Btu/lb	13340	7240	15110	13250	1.1	12730
Forms of sulfur						
Sulfate	.007	.01	.07	.02	1.8	.04
Pyritic	.18	.03	3.5	.20	3.3	.62
Organic	.23	.22	2.0	.52	1.4	.76
Ash-fusion temperature °C						
Initial deformation	1330	1060	1600	1320	1.1	1260
Softening temperature	1360	1120	1600	1360	1.1	1300
Fluid temperature	1410	1180	1600	1400	1.1	1360
Free-swelling Index	6.9	15	9.0	6.2	1.8	5.6

Table 8b.--Arithmetic mean, observed range, geometric mean, and geometric deviation of ash content and contents of eleven major and minor oxides in the laboratory ash of 254 coal samples from West Virginia.

[All samples were ashed at 525°C; all data except geometric deviation are in percent.]

Oxide	Arithmetic mean	Observed range		Geometric mean	Geometric deviation	Geometric Mean 644 samples
		Minimum	Maximum			
(Ash)	9.47	1.7	45	7.82	1.8	9.76
SiO_2	47	21	67	46	1.2	43
Al_2O_3	27	11	42	26	1.2	24
CaO	2.1	.25	20	1.4	2.3	1.4
MgO	.86	.14	2.5	.77	1.6	.68
Na_2O	.61	.08	2.3	.48	2.0	.34
K_2O	2.0	.13	5.1	1.7	1.9	1.6
Fe_2O_3	10	1.6	54	7.8	2.2	11
MnO	.04	.002	1.4	.02	2.5	.02
TiO_2	1.4	.37	3.6	1.3	1.5	1.1
P_2O_5	.23	.01	2.7	.11	3.3	.13
SO_3	2.5	.07	14	1.8	2.4	1.7

Table 8c.--Arithmetic mean, observed range, geometric mean, and geometric deviation of 38 elements in 254 coal samples from West Virginia.

[All data are in parts-per-million and are reported on a whole-coal basis; L means less than value shown.]

Element	Arithmetic mean	Observed range Minimum	Observed range Maximum	Geometric mean	Geometric deviation	Geometric mean 644 samples
Ag	0.04	0.005L	0.41	0.03	2.7	0.03
As	72	1.0L	130	5.7	3.4	8.4
B	16	1.2	58	12	2.3	14
Ba	69	7.5	570	54	2.0	48
Be	2.2	.25	14	1.8	1.9	1.9
Cd	.09	.004L	3.1	.06	2.1	.07
Ce	19	4.0	110	16	1.8	16
Co	7.7	1.3	90	6.2	1.9	6.2
Cr	14	2.6	84	12	1.9	14
Cs	.95	.1L	8.0	.53	2.9	.66
Cu	19	3.	160	15	1.8	15
Eu	.37	.1	3.1	.31	1.7	.33
F	89	19L	390	56	2.4	51
Ga	5.0	.8	23	4.1	1.9	4.8
Ge	1.7	.07L	13	.51	5.5	1.1
Hf	.71	.1L	2.9	.56	2.0	.61
Hg	.17	.01L	.81	.08	3.8	.12
La	11	2.0	58	8.7	1.9	8.8
Li	16	1.1	140	12	2.1	15
Lu	.16	.1L	.7	.14	1.6	.15
Mn	27	.96	1400	10	3.1	14
Mo	1.6	.13L	8.2	1.1	2.3	1.5
Nb	1.6	.09L	8.2	1.1	2.4	1.4
Nd	8.4	1.4L	60	5.1	2.5	4.2
Ni	13	2.6	130	11	1.8	12
Pb	7.4	1.4	56	6.0	1.9	7.0
Sb	.92	.1L	5.1	.68	2.2	.73
Sc	3.5	.7	27	2.9	1.8	3.3
Se	3.4	.6L	16	2.6	2.1	2.8
Sm	1.9	.5	14	1.6	1.7	1.6
Sr	79	16L	430	65	1.8	65
Tb	.30	.1L	2.0	.25	1.8	.26
U	1.7	.2L	7.7	1.5	1.7	1.3
V	18	3.2	120	14	2.0	16
Y	6.9	1.1	41	5.7	1.8	6.2
Yb	.9	.2L	4.8	.76	1.7	.84
Zn	14	1.3	240	9.0	2.5	14
Zr	15	1.5	80	11	2.2	13

Table 8d.--Descriptions for 254 bituminous coal samples from West Virginia.

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w193726	West Virginia	Wyoming	372921n	811834w	Pocahontas	Pocahontas No 3	Channel	3.0
w193727	West Virginia	Wyoming	372921n	811834w	Pocahontas	Pocahontas No 3	Channel	13.0
w193728	West Virginia	Wyoming	372921n	811834w	Pocahontas	Pocahontas No 3	Channel	31.0
w193729	West Virginia	Mercer	372618n	811626w	Pocahontas	Pocahontas No 6	Channel	23.0
w193941	West Virginia	Raleigh	374641n	810819w	Pocahontas	Pocahontas No 3	Channel	33.0
w193942	West Virginia	Raleigh	374641n	810819w	Pocahontas	Pocahontas No 3	Channel	25.0
w193943	West Virginia	Raleigh	374311n	805710w	Pocahontas	Pocahontas No 3	channel	
w193944	West Virginia	Raleigh	374430n	810126w	Pocahontas	Pocahontas No 6	channel	
w193951	West Virginia	Wyoming	373956n	814234w	Kanawha	No 2 Gas	Channel	9.0
w193952	West Virginia	Wyoming	373956n	814234w	Kanawha	No 2 Gas	Channel	40.0
w193953	West Virginia	Wyoming	373956n	814234w	Kanawha	Powellton A	Channel	7.0
w193954	West Virginia	Wyoming	373956n	814234w	Kanawha	Powellton	Channel	22.0
w193955	West Virginia	Mingo	374120n	820716w	Kanawha	Coalburg	Channel	50.0
w193956	West Virginia	Mingo	374120n	820716w	Kanawha	Coalburg	Channel	12.0
w193957	West Virginia	Mingo	374120n	820716w	Kanawha	Coalburg	Channel	22.0
w193958	West Virginia	Mcdowell	372200n	813614w	Pocahontas	Pocahontas No 4	Channel	79.0
w193959	West Virginia	Mcdowell	372200n	813614w	Pocahontas	Pocahontas No 4	Channel	10.0
w193960	West Virginia	Mcdowell	372200n	813614w	Pocahontas	Pocahontas No 4	Channel	69.0
w193961	West Virginia	Mcdowell	372446n	813037w	Pocahontas	Pocahontas No 4	Channel	63.0
w193962	West Virginia	Mcdowell	372446n	813037w	Pocahontas	Pocahontas No 4	Channel	29.0
w193963	West Virginia	Mcdowell	372446n	813037w	Pocahontas	Pocahontas No 4	Channel	34.0
w193964	West Virginia	Mcdowell	372220n	813218w	Pocahontas	Pocahontas No 3	Channel	51.0
w193965	West Virginia	Mcdowell	372220n	813218w	Pocahontas	Pocahontas No 3	Channel	24.0
w193966	West Virginia	Mcdowell	372220n	813218w	Pocahontas	Pocahontas No 3	Channel	28.0
w193967	West Virginia	Wyoming	373248n	813756w	New River	Sewell	Channel	36.0
w193968	West Virginia	Mcdowell	372520n	814122w	New River	Iaeger	Channel	27.0
w193969	West Virginia	Mcdowell	372438n	814023w	New River	Sewell	Channel	30.0
w193970	West Virginia	Mcdowell	372420n	813555w	New River	Welch	Channel	43.0
w193971	West Virginia	Mcdowell	372420n	813555w	New River	Welch	Channel	11.0
w193972	West Virginia	Mcdowell	372420n	813555w	New River	Welch	Channel	32.0
w193973	West Virginia	Wyoming	372835n	812308w	Pocahontas	Pocahontas No 3	Channel	56.0
w193974	West Virginia	Wyoming	372926n	812421w	Pocahontas	Pocahontas No 3	Channel	14.0
w193975	West Virginia	Wyoming	372926n	812421w	Pocahontas	Pocahontas No 3	Channel	44.0
w193976	West Virginia	Mcdowell	372750n	812808w	Pocahontas	Pocahontas No 3	Channel	55.0
w193977	West Virginia	Wyoming	373702n	813358w	New River	Sewell	Channel	44.0

Table 8d.--Descriptions for 254 bituminous coal samples from West Virginia--continued

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w193978	West Virginia	Wyoming	373702n	813358w	New River	Sewell	Channel	20.0
w193979	West Virginia	Wyoming	373702n	813358w	New River	Sewell	Channel	25.0
w193980	West Virginia	Mcdowell	372450n	812152w	Pocahontas	Pocahontas No 6	Channel	44.0
w193981	West Virginia	Mcdowell	372406n	812125w	New River	Fire Creek	Channel	28.0
w193982	West Virginia	Mcdowell	372404n	814058w	Pocahontas	Pocahontas No 4	Channel	50.0
w193983	West Virginia	Mcdowell	372049n	813747w	Pocahontas	Pocahontas No 4	Channel	76.0
w193984	West Virginia	Mcdowell	372116n	813136w	Pocahontas	Pocahontas No 4	Channel	60.0
w193985	West Virginia	Mcdowell	372116n	813136w	Pocahontas	Pocahontas No 4	Channel	35.0
w193986	West Virginia	Mcdowell	372116n	813136w	Pocahontas	Pocahontas No 4	Channel	25.0
w193987	West Virginia	Mcdowell	372121n	813058w	Pocahontas	Pocahontas No 3	Channel	46.0
w193988	West Virginia	Mcdowell	372458n	813442w	New River	Welch	Channel	47.0
w193991	West Virginia	Wyoming	373017n	813443w	New River	Sewell	Channel	33.0
w193992	West Virginia	Wyoming	373017n	813443w	New River	Sewell	Channel	24.0
w193993	West Virginia	Wyoming	373017n	813443w	New River	Sewell	Channel	9.0
w193994	West Virginia	Mcdowell	372700n	814120w	New River	Sewell	Channel	35.0
w193995	West Virginia	Mcdowell	372714n	814209w	New River	Sewell	Channel	42.0
w193996	West Virginia	Mcdowell	372714n	814209w	New River	Sewell	Channel	16.0
w193997	West Virginia	Mcdowell	372714n	814209w	New River	Sewell	Channel	26.0
w193998	West Virginia	Mcdowell	371948n	813831w	New River	Sewell	Channel	45.0
w193999	West Virginia	Mcdowell	371948n	813831w	New River	Sewell	Channel	17.0
w194000	West Virginia	Mcdowell	371948n	813831w	New River	Sewell	Channel	23.0
w194001	West Virginia	Mcdowell	372020n	813957w	New River	Beckley	Channel	51.0
w194002	West Virginia	Mcdowell	372116n	813957w	New River	Sewell	Channel	23.0
w194003	West Virginia	Mcdowell	372114n	814025w	New River	Sewell	Channel	34.0
w194004	West Virginia	Mcdowell	372251n	813717w	New River	Sewell	Channel	33.0
w194005	West Virginia	Mcdowell	372251n	813717w	New River	Sewell	Channel	17.0
w194006	West Virginia	Mcdowell	372251n	813717w	New River	Sewell	Channel	16.0
w194007	West Virginia	Mcdowell	372749n	813731w	New River	Sewell	Channel	37.0
w194008	West Virginia	Mcdowell	372749n	813731w	New River	Sewell	Channel	17.0
w194009	West Virginia	Mcdowell	372749n	813731w	New River	Sewell	Channel	20.0
w194010	West Virginia	Mcdowell	372243n	812730w	New River	Pocahontas No 8	Channel	38.0
w194011	West Virginia	Mcdowell	372146n	814123w	Pocahontas	Pocahontas No 4	Channel	70.0
w194012	West Virginia	Wyoming	372624n	812004w	New River	Pocahontas No 8	Channel	41.0
w194013	West Virginia	Wyoming	372624n	812004w	New River	Pocahontas No 8	Channel	22.0
w194014	West Virginia	Wyoming	372624n	812004w	New River	Pocahontas No 8	Channel	19.0

Table 8d.--Descriptions for 254 bituminous coal samples from West Virginia--continued

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w194015	West Virginia	Mcdowell	372502n	812017w	Pocahontas	Pocahontas No 6	Channel	36.0
w194016	West Virginia	Wyoming	372951n	812034w	Pocahontas	Pocahontas No 3	Channel	51.0
w194017	West Virginia	Wyoming	372951n	812034w	Pocahontas	Pocahontas No 3	Channel	14.0
w194018	West Virginia	Wyoming	372951n	812034w	Pocahontas	Pocahontas No 3	Channel	37.0
w194019	West Virginia	Wyoming	372635n	812225w	Pocahontas	Pocahontas No 6	Channel	41.0
w194020	West Virginia	Wyoming	372727n	812252w	Pocahontas	Pocahontas No 6	Channel	30.0
w194021	West Virginia	Wyoming	373319n	813409w	New River	Sewell	Channel	30.0
w199324	West Virginia	Kanawha	381702n	813146w	Kanawha	Campbell Creek	Channel	19.0
w199325	West Virginia	Kanawha	381702n	813146w	Kanawha	Campbell Creek	Channel	22.0
w199326	West Virginia	Kanawha	381702n	813146w	Kanawha	Stockton-Lewiston	Channel	31.0
w199327	West Virginia	Kanawha	381702n	813146w	Kanawha	Stockton-Lewiston	Channel	8.0
w199328	West Virginia	Kanawha	381702n	813146w	Kanawha	Stockton-Lewiston	Channel	12.0
w199329	West Virginia	Kanawha	381702n	813146w	Allegheny	No 6 Block	Channel	12.0
w199330	West Virginia	Kanawha	381702n	813146w	Allegheny	No 6 Block	Channel	12.0
w199331	West Virginia	Kanawha	381702n	813146w	Kanawha	Stockton A	Channel	8.0
w199332	West Virginia	Kanawha	381702n	813146w	Kanawha	Stockton A	Channel	4.0
w199000	West Virginia	Pocahontas	381626n	802030w	New River	Fire Creek	Channel	58.0
w199001	West Virginia	Pocahontas	381626n	802030w	New River	Fire Creek	Channel	57.0
w199002	West Virginia	Pocahontas	381542n	801722w	New River	Fire Creek	Channel	14.0
w199003	West Virginia	Pocahontas	381542n	801722w	New River	Fire Creek	Channel	20.0
w199004	West Virginia	Pocahontas	381635n	801140w	New River	Beckley	Channel	31.0
w199005	West Virginia	Webster	382112n	802532w	New River	Fire Creek	Channel	33.0
w199006	West Virginia	Webster	382112n	802532w	New River	Fire Creek	Channel	18.0
w199007	West Virginia	Webster	381934n	802323w	New River	Fire Creek	Channel	32.0
w199008	West Virginia	Pocahontas	381612n	801758w	Pocahontas	Pocahontas No 3	Channel	62.0
w199009	West Virginia	Pocahontas	381600n	801805w	Pocahontas	Pocahontas No 3	Channel	61.0
w199010	West Virginia	Pocahontas	381538n	801954w	Pocahontas	Pocahontas No 3	Channel	40.0
w199011	West Virginia	Pocahontas	381813n	802000w	New River	Little Raleigh	Channel	42.0
w199012	West Virginia	Pocahontas	381813n	802000w	New River	Little Raleigh	Channel	42.0
w199013	West Virginia	Pocahontas	381758n	801558w	New River	Beckley	Channel	26.0
w199014	West Virginia	Pocahontas	381807n	801648w	New River	Beckley	Channel	28.0
w199015	West Virginia	Pocahontas	381737n	801547w	New River	Beckley	Channel	28.0
w199016	West Virginia	Pocahontas	381752n	801635w	New River	Beckley	Channel	24.0
w199017	West Virginia	Pocahontas	381736n	801747w	New River	Beckley	Channel	28.0
w199018	West Virginia	Webster	381924n	802158w	New River	Little Raleigh	Channel	51.0

Table 8d.--Descriptions for 254 bituminous coal samples from West Virginia--continued

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w199019	West Virginia	Pocahontas	381825n	801438w	New River	Fire Creek	Channel	20.0
w199020	West Virginia	Pocahontas	381825n	801438w	New River	Fire Creek	Channel	28.0
w199021	West Virginia	Pocahontas	381812n	801904w	New River	Little Raleigh	Channel	24.0
w199022	West Virginia	Pocahontas	381924n	802158w	New River	Little Raleigh	Channel	42.0
w199023	West Virginia	Pocahontas	381924n	802158w	New River	Little Raleigh	Channel	42.0
w199024	West Virginia	Webster	382133n	802505w	New River	Fire Creek	Channel	54.0
w198544	West Virginia	Kanawha	381930n	811700w	Allegheny	Lower Kittanning	Channel	40.0
w198545	West Virginia	Kanawha	381500n	812515w	Allegheny	Lower Kittanning	Channel	40.0
w198546	West Virginia	Wayne	380430n	822600w	Allegheny	Lower Kittanning	Channel	40.0
w198547	West Virginia	Kanawha	380715n	812930w	Allegheny	Lower Kittanning	Channel	53.0
w198548	West Virginia	Randolph	384900n	795930w	Allegheny	Lower Kittanning	Channel	50.0
w199418	West Virginia	Kanawha	381700n	812345w	Kanawha	Stockton	Channel	70.0
w199419	West Virginia	Kanawha	381631n	812152w	Kanawha	Coalburg	Channel	44.0
w199420	West Virginia	Kanawha	381858n	812025w	Allegheny	No 6 Block	Channel	51.0
w199421	West Virginia	Kanawha	382638n	813748w	Monongahela	Pittsburgh	Channel	68.0
w199422	West Virginia	Monongalia	394211n	800644w	Monongahela	Pittsburgh	Channel	91.0
w199425	West Virginia	Kanawha	381930n	811604w	Allegheny	No 6 Block	Channel	50.0
w195104	West Virginia	Mcdowell	371645n	813826w	New River	Pocahontas No 11	Drill Core	
w195105	West Virginia	Mcdowell	371645n	813826w	New River	Pocahontas No 12	Drill Core	
w195106	West Virginia	Mcdowell	371605n	813806w	Pocahontas	Pocahontas No 1	Drill Core	
w195107	West Virginia	Mcdowell	371613n	813747w	New River	Pocahontas No 11	Drill Core	
w195108	West Virginia	Mcdowell	371613n	813747w	New River	Pocahontas No 9	Drill Core	
w195109	West Virginia	Mcdowell	371613n	813747w	Pocahontas	Pocahontas No 7	Drill Core	
w195110	West Virginia	Mcdowell	371424n	814136w	New River	Middle Seaboard	Drill Core	
w195131	West Virginia	Mcdowell	372112n	812531w	New River	No Data Entered	Drill Core	
w195132	West Virginia	Mcdowell	372112n	812531w	New River	Pocahontas No 9	Drill Core	
w201629	West Virginia	Kanawha	382838n	813536w	Monongahela	Pittsburgh	Channel	46.0
w201530	West Virginia	Kanawha	382412n	813231w	Allegheny	No 5 Block	Channel	20.0
w201531	West Virginia	Kanawha	382412n	813231w	Allegheny	No 5 Block	Channel	26.0
w201532	West Virginia	Kanawha	382412n	813231w	Allegheny	No 5 Block	Channel	8.0
w201533	West Virginia	Kanawha	382412n	813231w	Allegheny	No 5 Block	Channel	36.0
w201534	West Virginia	Kanawha	382301n	813540w	Allegheny	No 5 Block	Channel	19.0
w194951	West Virginia	Braxton	384031n	805145w	Monongahela	Pittsburgh	Channel	36.0
w194952	West Virginia	Barbour	390348n	800609w	Allegheny	Lower Kittanning	Channel	53.0
w194953	West Virginia	Barbour	390945n	795937w	Allegheny	Middle Kittanning	Channel	35.0

Table 8d.--Descriptions for 254 bituminous coal samples from West Virginia--continued

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w194954	West Virginia	Barbour	390949n	800343w	Allegheny	Upper Kittanning	Channel	54.0
w194955	West Virginia	Barbour	390827n	800326w	Allegheny	Middle Kittanning	Channel	49.0
w194956	West Virginia	Upshur	384645n	802116w	Allegheny	Lower Kittanning	Channel	69.0
w194957	West Virginia	Upshur	385020n	801228w	Allegheny	Middle Kittanning	Channel	41.0
w194958	West Virginia	Taylor	391917n	800406w	Monongahela	Pittsburgh	Channel	88.0
w194959	West Virginia	Taylor	391444n	800722w	Monongahela	Pittsburgh	Channel	67.0
w194960	West Virginia	Barbour	391353n	801015w	Monongahela	Pittsburgh	Channel	72.0
w194961	West Virginia	Barbour	391353n	801015w	Monongahela	Redstone	Channel	57.0
w194962	West Virginia	Barbour	390756n	801221w	Monongahela	Redstone	Channel	65.0
w194963	West Virginia	Barbour	390820n	801228w	Monongahela	Pittsburgh	Channel	76.0
w194964	West Virginia	Barbour	390740n	800754w	Monongahela	Redstone	Channel	65.0
w194965	West Virginia	Barbour	390732n	800815w	Monongahela	Pittsburgh	Channel	85.0
w194966	West Virginia	Barbour	391151n	801127w	Monongahela	Redstone	Channel	20.0
w194967	West Virginia	Barbour	391151n	801127w	Monongahela	Redstone	Channel	53.0
w194968	West Virginia	Barbour	391130n	800931w	Monongahela	Pittsburgh	Channel	102.0
w194969	West Virginia	Barbour	391103n	800732w	Monongahela	Pittsburgh	Channel	107.0
w194970	West Virginia	Barbour	391105n	800722w	Monongahela	Redstone	Channel	40.0
w194971	West Virginia	Barbour	391122n	800621w	Monongahela	Redstone	Channel	29.0
w194972	West Virginia	Barbour	390821n	801006w	Monongahela	Redstone	Channel	72.0
w194973	West Virginia	Barbour	390631n	801237w	Monongahela	Redstone	Channel	69.0
w194974	West Virginia	Harrison	390643n	801734w	Monongahela	Redstone	Channel	62.0
w194975	West Virginia	Barbour	390702n	800847w	Monongahela	Redstone	Channel	69.0
w194976	West Virginia	Barbour	390648n	800853w	Monongahela	Pittsburgh	Channel	90.0
w194977	West Virginia	Upshur	390312n	801245w	Monongahela	Redstone	Channel	55.0
w194978	West Virginia	Upshur	390257n	801111w	Monongahela	Pittsburgh	Channel	42.0
w194979	West Virginia	Lewis	390405n	802056w	Monongahela	Redstone	Channel	52.0
w194980	West Virginia	Lewis	390448n	801932w	Monongahela	Redstone	Channel	32.0
w194981	West Virginia	Lewis	390119n	802053w	Monongahela	Redstone	Channel	45.0
w194982	West Virginia	Lewis	390341n	802303w	Monongahela	Redstone	Channel	61.0
w194983	West Virginia	Upshur	390011n	801756w	Monongahela	Redstone	Channel	47.0
w194984	West Virginia	Boone	375009n	813739w	Kanawha	Dingess	Channel	49.0
w194985	West Virginia	Mingo	373439n	820017w	Kanawha	Alma	Channel	40.0
w194986	West Virginia	Mcdowell	372600n	812828w	New River	Pocahontas No 9	Channel	35.0
w194987	West Virginia	Mcdowell	372620n	812742w	New River	Fire Creek	Channel	46.0
w194988	West Virginia	Wyoming	373709n	813636w	Kanawha	Gilbert	Channel	26.0

Table 8d.--Descriptions for 254 bituminous coal samples from West Virginia--continued

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w194989	West Virginia	Raleigh	373741n	811012w	Pocahontas	Pocahontas No 6	Channel	30.0
w194990	West Virginia	Raleigh	373751n	811012w	New River	Beckley	Channel	27.0
w194991	West Virginia	Raleigh	374654n	810827w	Pocahontas	Pocahontas No 2	Channel	27.0
w194992	West Virginia	Raleigh	374654n	810827w	Pocahontas	Pocahontas No 3	Channel	35.0
w194993	West Virginia	Logan	374804n	814817w	Kanawha	Stockton	Channel	52.0
w194994	West Virginia	Logan	374804n	814817w	Kanawha	Stockton	Channel	46.0
w194995	West Virginia	Logan	374830n	814554w	Kanawha	Stockton	Channel	33.0
w194996	West Virginia	Logan	374830n	814554w	Kanawha	Stockton	Channel	59.0
w194997	West Virginia	Logan	374830n	814554w	Kanawha	Stockton	Channel	20.0
w194998	West Virginia	Logan	374830n	814554w	Kanawha	Stockton	Channel	45.0
w194999	West Virginia	Boone	380223n	813333w	Kanawha	Lower Cedar Grove	Channel	39.0
w195000	West Virginia	Boone	380223n	813333w	Kanawha	Lower Cedar Grove	Channel	7.0
w195001	West Virginia	Logan	374631n	814049w	Kanawha	Coalburg	Channel	31.0
w195002	West Virginia	Logan	374631n	814049w	Kanawha	Coalburg	Channel	24.0
w195003	West Virginia	Logan	374627n	814118w	Kanawha	Stockton A	Channel	12.0
w195004	West Virginia	Logan	374627n	814118w	Kanawha	Stockton A	Channel	32.0
w195009	West Virginia	Boone	380740n	815327w	Kanawha	Stockton	Channel	7.0
w195010	West Virginia	Logan	380151n	815518w	Kanawha	Chilton	Channel	16.0
w195011	West Virginia	Logan	380151n	815518w	Kanawha	Chilton	Channel	26.0
w195012	West Virginia	Logan	380151n	815518w	Kanawha	Chilton	Channel	6.0
w195013	West Virginia	Boone	375958n	815529w	Kanawha	Peerless	Channel	16.0
w195014	West Virginia	Boone	375959n	815521w	Kanawha	Alma	Channel	23.0
w195015	West Virginia	Boone	375959n	815521w	Kanawha	Alma	Channel	8.0
w195016	West Virginia	Boone	375958n	815520w	Kanawha	Alma A	Channel	20.0
w195017	West Virginia	Boone	375958n	815519w	Kanawha	Lower Cedar Grove	Channel	18.0
w195018	West Virginia	Logan	375047n	815657w	Kanawha	Hernshaw	Channel	9.0
w195019	West Virginia	Logan	375047n	815657w	Kanawha	Hernshaw	Channel	22.0
w195020	West Virginia	Logan	374436n	815438w	Kanawha	Lower Cedar Grove	Channel	26.0
w195034	West Virginia	Logan	375634n	815626w	Kanawha	No 2 Gas	Channel	38.0
w195035	West Virginia	Logan	375634n	815626w	Kanawha	No 2 Gas	Channel	4.0
w195036	West Virginia	Logan	374224n	814739w	Kanawha	Lower Cedar Grove	Channel	34.0
w195037	West Virginia	Mingo	374116n	821356w	Kanawha	Winifrede	Channel	41.0
w195038	West Virginia	Mingo	373846n	820938w	Kanawha	Alma	Channel	43.0
w195039	West Virginia	Logan	374818n	814613w	Kanawha	Lower Cedar Grove	Channel	44.0
w195040	West Virginia	Boone	375257n	814216w	Kanawha	No 5 Block	Channel	23.0

Table 8d.--Descriptions for 254 bituminous coal samples from West Virginia--continued

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w195041	West Virginia	Boone	375257n	814216w	Allegheny	No 5 Block	Channel	69.0
w195042	West Virginia	Logan	374037n	815145w	Kanawha	Cedar Grove Rider	Channel	4.0
w195043	West Virginia	Logan	374037n	815145w	Kanawha	Cedar Grove Rider	Channel	34.0
w195044	West Virginia	Logan	374021n	815143w	Kanawha	Matewan	Channel	32.0
w195045	West Virginia	Logan	380540n	813445w	Allegheny	No 5 Block	Channel	53.0
w195046	West Virginia	Logan	380540n	813445w	Allegheny	No 5 Block	Channel	36.0
w195047	West Virginia	Raleigh	375258n	813035w	Kanawha	Campbell Creek	Channel	10.0
w195048	West Virginia	Raleigh	375258n	813035w	Kanawha	Campbell Creek	Channel	33.0
w195049	West Virginia	Raleigh	375258n	813035w	Kanawha	Peerless	Channel	11.0
w195050	West Virginia	Raleigh	375258n	813035w	Kanawha	Peerless	Channel	15.0
w195051	West Virginia	Raleigh	375258n	813035w	Kanawha	Peerless	Channel	38.0
w195052	West Virginia	Boone	375957n	815516w	Kanawha	Upper Cedar Grove	Channel	15.0
w195053	West Virginia	Boone	375957n	815516w	Kanawha	Upper Cedar Grove	Channel	25.0
w195054	West Virginia	Logan	374049n	815320w	Kanawha	Alma	Channel	39.0
w195055	West Virginia	Logan	375450n	815805w	Kanawha	Campbell Creek	Channel	31.0
w195056	West Virginia	Logan	374054n	815328w	Kanawha	Cedar Grove	Channel	44.0
w195057	West Virginia	Logan	374204n	815410w	Kanawha	Cedar Grove	Channel	44.0
w195058	West Virginia	Logan	374314n	815500w	Kanawha	Upper Alma	Channel	45.0
w195059	West Virginia	Logan	374345n	815344w	Kanawha	Campbell Creek	Channel	32.0
w195060	West Virginia	Logan	374158n	815313w	Kanawha	Upper Cedar Grove	Channel	55.0
w195061	West Virginia	Logan	375507n	814751w	Kanawha	Upper Stockton	Channel	51.0
w195062	West Virginia	Logan	375444n	814851w	Kanawha	Chilton	Channel	35.0
w195063	West Virginia	Logan	375405n	815155w	Kanawha	Stockton	Channel	7.0
w195064	West Virginia	Logan	375405n	815155w	Kanawha	Stockton	Channel	65.0
w195066	West Virginia	Logan	374046n	815133w	Kanawha	Alma	Channel	55.0
w195067	West Virginia	Logan	374039n	815152w	Kanawha	Dingess	Channel	42.0
w195068	West Virginia	Logan	374021n	815419w	Kanawha	Cedar Grove	Channel	51.0
w195005	West Virginia	Boone	380727n	815234w	Kanawha	Coalburg	Channel	35.0
w195006	West Virginia	Boone	380740n	815327w	Kanawha	Stockton	Channel	5.0
w195007	West Virginia	Boone	380740n	815327w	Kanawha	Stockton	Channel	8.0
w195008	West Virginia	Boone	380740n	815327w	Kanawha	Stockton	Channel	50.0
w195033	West Virginia	Mingo	374524n	821805w	Kanawha	Coalburg A	Channel	19.0
w195021	West Virginia	Logan	374423n	815643w	Kanawha	No 2 Gas	Channel	40.0
w195022	West Virginia	Logan	374139n	815630w	Kanawha	Dingess	Channel	42.0
w195023	West Virginia	Logan	374139n	815630w	Kanawha	Dingess	Channel	9.0

Table 8d.--Descriptions for 254 bituminous coal samples from West Virginia--continued

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w195024	West Virginia	Wyoming	374359n	814025w	Kanawha	Lower Cedar Grove	Channel	31.0
w195025	West Virginia	Mingo	373812n	820518w	Kanawha	Campbell Creek	Channel	15.0
w195026	West Virginia	Mingo	373812n	820518w	Kanawha	Campbell Creek	Channel	21.0
w195027	West Virginia	Mingo	373831n	820632w	Kanawha	Campbell Creek	Channel	18.0
w195028	West Virginia	Mingo	373831n	820632w	Kanawha	Campbell Creek	Channel	18.0
w195029	West Virginia	Mingo	373559n	815554w	Kanawha	Upper Cedar Grove	Channel	76.0
w195030	West Virginia	Mingo	374528n	821815w	Kanawha	Chilton A	Channel	23.0
w195031	West Virginia	Mingo	374524n	821805w	Kanawha	Coalburg	Channel	19.0
w195032	West Virginia	Mingo	374524n	821805w	Kanawha	Coalburg	Channel	37.0

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia.

[All analyses except Kcal/kg, Btu, free-swelling index and ash-fusion temperatures in percent. For each sample number, the analyses are reported three ways; first, as-received, second, moisture free, and third, moisture and ash free. All analyses by Coal Analysis Section, Department of Energy, Pittsburgh, Pa. B, not determined. 1600G for ash-fusion temperatures means greater than 1600 C.]

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w193726	0.5	12.8	48.5	38.2	2.8	54.0	0.7	3.9	0.4	5,120	9,210
	---	12.9	48.7	38.4	2.8	54.3	.7	3.5	.4	5,140	9,260
	---	20.9	79.1	---	4.5	88.1	1.1	5.6	.7	8,350	15,030
w193727	2.4	15.6	72.1	9.9	4.3	79.7	1.0	4.7	.6	7,610	13,690
	---	16.0	73.9	10.1	4.1	81.7	1.0	2.6	.6	7,800	14,030
	---	17.8	82.2	---	4.6	90.9	1.1	2.9	.7	8,680	15,620
w193728	1.9	17.8	76.7	3.6	4.6	86.0	1.2	4.0	.6	8,280	14,910
	---	18.1	78.2	3.7	4.5	87.7	1.2	2.4	.6	8,440	15,200
	---	18.8	81.2	---	4.6	91.0	1.3	2.4	.6	8,770	15,780
w193729	.8	18.4	76.5	4.3	4.6	85.8	1.2	3.0	1.1	8,340	15,010
	---	18.5	77.1	4.3	4.5	86.5	1.2	2.3	1.1	8,410	15,130
	---	19.4	80.6	---	4.8	90.4	1.3	2.4	1.2	8,790	15,820
w193951	1.3	33.0	62.1	3.6	5.0	81.9	1.6	7.0	.9	8,160	14,680
	---	33.4	62.9	3.6	4.9	83.0	1.6	5.9	.9	8,260	14,880
	---	34.7	65.3	---	5.1	86.1	1.7	6.1	.9	8,580	15,440
w193952	3.4	27.6	55.3	13.7	4.7	71.8	1.3	7.8	.8	7,070	12,720
	---	28.6	57.2	14.2	4.5	74.3	1.3	4.9	.8	7,320	13,170
	---	33.3	66.7	---	5.2	86.6	1.6	5.8	1.0	8,530	15,350
w193953	4.3	31.1	59.8	4.8	5.3	79.1	1.5	8.4	.9	7,860	14,150
	---	32.5	62.5	5.0	5.0	82.7	1.6	4.8	.9	8,210	14,780
	---	34.2	65.8	---	5.3	87.0	1.7	5.0	1.0	8,650	15,560
w193954	2.6	31.1	62.3	4.0	5.1	81.8	1.5	6.8	.7	8,080	14,540
	---	31.9	64.0	4.1	4.9	84.0	1.5	4.6	.7	8,290	14,930
	---	33.3	66.7	---	5.2	87.6	1.6	4.8	.7	8,650	15,570
w193955	4.4	31.3	50.3	14.0	4.8	67.6	1.3	11.5	.8	6,590	11,860
	---	32.7	52.6	14.6	4.5	70.7	1.4	7.9	.8	6,890	12,410
	---	38.4	61.6	---	5.3	82.8	1.6	9.3	1.0	8,080	14,540
w193956	5.9	27.4	45.0	21.7	4.6	59.4	1.1	12.7	.5	5,820	10,480
	---	29.1	47.8	23.1	4.2	63.1	1.2	7.9	.5	6,190	11,140
	---	37.8	62.2	---	5.4	82.0	1.5	10.3	.7	8,040	14,480
w193957	5.3	34.2	54.5	6.0	5.3	74.1	1.4	12.5	.6	7,350	13,230
	---	36.1	57.6	6.3	5.0	78.2	1.5	8.2	.6	7,760	13,980
	---	38.6	61.4	---	5.3	83.5	1.6	8.8	.7	8,290	14,920

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w193726	0.0	0.01	0.15	0.25	8.5	1,540	1,540	1,540
	---	.01	.15	.25				
	---	.02	.24	.41				
w193727	1.7	.01	.22	.32	9.0	1,540	1,540	1,540
	---	.01	.23	.33				
	---	.01	.25	.36				
w193728	1.4	.01	.24	.35	8.5	1,465	1,520	1,540
	---	.01	.24	.36				
	---	.01	.25	.37				
w193729	.4	.02	.59	.54	9.0	1,220	1,285	1,455
	---	.02	.59	.54				
	---	.02	.62	.57				
w193951	.6	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193952	2.1	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193953	3.1	B	B	B	9.0	1,285	1,340	1,390
	---	B	B	B				
	---	B	B	B				
w193954	1.5	B	B	B	8.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193955	1.7	B	B	B	1.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193956	2.8	B	B	B	1.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193957	2.5	B	B	B	3.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Moisture	Proximate Analysis: Volatile matter	Fixed carbon	Ash	Ultimate Analysis: Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Heat of Combustion: Kcal/kg	Btu/lb
W193958	1.5	15.0	77.5	6.0	4.3	84.0	1.2	3.7	0.8	8,080	14,540
	---	15.2	78.7	6.1	4.2	85.3	1.2	2.4	.8	8,200	14,760
	---	16.2	83.8	---	4.5	90.8	1.3	2.6	.9	8,730	15,720
W193959	1.2	15.5	74.6	8.7	4.4	81.0	1.3	2.6	2.0	7,840	14,120
	---	15.7	75.5	8.8	4.3	82.0	1.3	1.6	2.0	7,940	14,290
	---	17.2	82.8	---	4.7	89.9	1.4	1.7	2.2	8,710	15,670
W193960	1.5	15.3	77.8	5.4	4.4	84.9	1.2	3.4	.7	8,120	14,620
	---	15.5	79.0	5.5	4.3	86.2	1.2	2.1	.7	8,250	14,840
	---	16.4	83.6	---	4.5	91.2	1.3	2.2	.8	8,720	15,700
W193961	2.7	14.4	74.8	8.1	4.6	80.8	1.1	4.5	.8	7,800	14,040
	---	14.8	76.9	8.3	4.4	83.0	1.1	2.2	.8	8,020	14,430
	---	16.1	83.9	---	4.8	90.6	1.2	2.4	.9	8,750	15,740
W193962	2.9	16.0	75.4	5.7	4.6	83.0	1.2	4.9	.7	8,030	14,450
	---	16.5	77.7	5.9	4.4	85.5	1.2	2.4	.7	8,270	14,880
	---	17.5	82.5	---	4.7	90.8	1.3	2.5	.8	8,780	15,810
W193963	2.0	16.6	75.5	5.9	4.6	83.2	1.1	4.6	.6	8,060	14,510
	---	16.9	77.0	6.0	4.5	84.9	1.1	2.9	.6	8,220	14,800
	---	18.0	82.0	---	4.8	90.3	1.2	3.1	.7	8,750	15,750
W193964	3.0	15.0	74.9	7.1	4.4	81.8	1.1	4.7	.8	7,870	14,170
	---	15.5	77.2	7.3	4.2	84.3	1.1	2.1	.8	8,110	14,600
	---	16.7	83.3	---	4.5	91.0	1.2	2.3	.9	8,750	15,760
W193965	2.6	15.9	77.3	4.2	4.5	84.5	1.1	4.8	.9	8,140	14,640
	---	16.3	79.4	4.3	4.3	86.8	1.1	2.6	.9	8,350	15,040
	---	17.1	82.9	---	4.5	90.7	1.2	2.7	1.0	8,730	15,710
W193966	2.6	14.6	72.1	10.7	4.2	78.7	1.0	4.3	1.0	7,540	13,580
	---	15.0	74.0	11.0	4.0	80.8	1.0	2.0	1.0	7,740	13,940
	---	16.8	83.2	---	4.5	90.8	1.2	2.3	1.2	8,700	15,660
W193967	2.8	21.3	67.8	8.1	4.7	79.7	1.4	5.2	.9	7,760	13,970
	---	21.9	69.8	8.3	4.5	82.0	1.4	2.8	.9	7,980	14,370
	---	23.9	76.1	---	4.9	89.5	1.6	3.0	1.0	8,710	15,680
W193968	2.6	19.8	72.0	5.6	4.7	82.4	1.5	5.1	.7	8,020	14,430
	---	20.3	73.9	5.7	4.5	84.6	1.5	2.9	.7	8,230	14,820
	---	21.6	78.4	---	4.8	89.8	1.6	3.0	.8	8,740	15,720
W193969	3.4	16.9	68.8	10.9	4.3	76.9	1.3	5.4	1.1	7,450	13,400
	---	17.5	71.2	11.3	4.1	79.6	1.3	2.5	1.1	7,710	13,880
	---	19.7	80.3	---	4.6	89.7	1.5	2.8	1.3	8,690	15,640

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w193958	0.0	B	B	B	7.5	1,200	1,255	1,295
	---	B	B	B				
	---	B	B	B				
w193959	.0	B	B	B	9.0	1,190	1,240	1,305
	---	B	B	B				
	---	B	B	B				
w193960	.0	B	B	B	7.5	1,215	1,260	1,315
	---	B	B	B				
	---	B	B	B				
w193961	2.3	B	B	B	8.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193962	2.3	B	B	B	7.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193963	1.6	B	B	B	8.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193964	2.5	B	B	B	8.0	1,430	1,495	1,540
	---	B	B	B				
	---	B	B	B				
w193965	2.0	B	B	B	7.5	1,345	1,405	1,450
	---	B	B	B				
	---	B	B	B				
w193966	1.6	B	B	B	6.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193967	2.0	B	B	B	9.0	1,435	1,500	1,540
	---	B	B	B				
	---	B	B	B				
w193968	1.6	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193969	2.6	B	B	B	9.0	1,495	1,540	1,540
	---	B	B	B				
	---	B	B	B				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w193970	2.4	16.5	71.5	9.6	4.3	79.4	1.4	4.7	0.6	7,650	13,780
	---	16.9	73.3	9.8	4.1	81.4	1.4	2.6	.6	7,840	14,120
	---	18.7	81.2	---	4.6	90.2	1.6	2.9	.7	8,700	15,660
w193971	2.5	18.7	74.9	3.9	4.7	84.4	1.6	4.7	.7	8,200	14,770
	---	19.2	76.8	4.0	4.5	86.6	1.6	2.5	.7	8,410	15,150
	---	20.0	80.0	---	4.7	90.2	1.7	2.6	.7	8,760	15,780
w193972	3.0	15.8	70.0	11.2	4.2	77.7	1.2	5.1	.5	7,470	13,440
	---	16.3	72.2	11.5	4.0	80.1	1.2	2.5	.5	7,700	13,860
	---	18.4	81.6	---	4.5	90.6	1.4	2.8	.6	8,710	15,670
w193973	2.4	16.1	73.2	8.3	4.3	81.0	1.1	4.9	.5	7,800	14,040
	---	16.5	75.0	8.5	4.1	83.0	1.1	2.8	.5	7,990	14,390
	---	18.0	82.0	---	4.5	90.7	1.2	3.1	.6	8,740	15,720
w193974	3.1	16.7	73.4	6.8	4.4	80.9	1.1	5.0	1.8	7,820	14,080
	---	17.2	75.7	7.0	4.2	83.5	1.1	2.3	1.9	8,070	14,530
	---	18.5	81.5	---	4.5	89.8	1.2	2.5	2.0	8,680	15,630
w193975	2.5	15.4	74.7	7.4	4.3	81.7	1.2	4.9	.5	7,870	14,170
	---	15.8	76.6	7.6	4.1	83.8	1.2	2.7	.5	8,070	14,530
	---	17.1	82.9	---	4.5	90.7	1.3	3.0	.6	8,740	15,720
w193976	2.3	15.4	75.0	7.3	4.2	82.5	1.1	4.3	.6	7,870	14,170
	---	15.8	76.8	7.5	4.0	84.4	1.1	2.3	.6	8,060	14,510
	---	17.0	83.0	---	4.4	91.3	1.2	2.5	.7	8,710	15,680
w193977	2.3	21.8	73.7	2.2	4.9	85.7	1.5	5.3	.5	8,350	15,030
	---	22.3	75.4	2.3	4.8	87.7	1.5	3.3	.5	8,550	15,390
	---	22.8	77.2	---	4.9	89.7	1.6	3.4	.5	8,740	15,740
w193978	3.6	21.9	72.3	2.2	5.0	84.5	1.6	6.0	.6	8,240	14,830
	---	22.7	75.0	2.3	4.8	87.7	1.7	2.9	.6	8,550	15,380
	---	23.2	76.8	---	4.9	89.7	1.7	3.0	.6	8,740	15,740
w193979	2.4	21.3	73.9	2.4	4.9	85.6	1.5	5.2	.4	8,340	15,010
	---	21.8	75.7	2.5	4.7	87.7	1.5	3.1	.4	8,550	15,380
	---	22.4	77.6	---	4.9	89.9	1.6	3.2	.4	8,760	15,770
w193980	1.5	18.9	70.0	9.6	4.5	79.2	1.3	4.2	1.2	7,720	13,890
	---	19.2	71.1	9.7	4.4	80.4	1.3	2.9	1.2	7,840	14,100
	---	21.3	78.7	---	4.9	89.1	1.5	3.2	1.3	8,680	15,630
w193981	3.1	19.9	73.6	3.4	4.8	84.1	1.4	5.6	.6	8,200	14,750
	---	20.5	76.0	3.5	4.6	86.8	1.4	2.9	.6	8,460	15,230
	---	21.3	78.7	---	4.8	89.9	1.5	3.0	.6	8,770	15,780

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Air-dried loss	Forms of sulfur: Sulfate	Forms of sulfur: Pyritic	Forms of sulfur: Organic	Free swelling	Ash fusion temperature C: Initial deform.	Ash fusion temperature C: soften.	Ash fusion temperature C: fluid
w193970	1.7	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193971	1.9	B	B	B	5.0	1,325	1,385	1,445
	---	B	B	B				
	---	B	B	B				
w193972	2.4	B	B	B	8.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193973	1.6	B	B	B	7.0	1,270	1,315	1,380
	---	B	B	B				
	---	B	B	B				
w193974	2.1	B	B	B	8.0	1,215	1,285	1,340
	---	B	B	B				
	---	B	B	B				
w193975	1.8	B	B	B	6.5	1,510	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193976	1.6	B	B	B	4.5	1,285	1,350	1,405
	---	B	B	B				
	---	B	B	B				
w193977	1.5	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193978	2.9	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193979	1.6	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193980	.8	B	B	B	9.0	1,305	1,375	1,440
	---	B	B	B				
	---	B	B	B				
w193981	2.2	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
W193982	1.0	14.3	77.7	7.0	4.2	84.2	1.1	3.0	0.5	8,040	14,460
	---	14.4	78.5	7.1	4.1	85.1	1.1	2.1	.5	8,120	14,610
	---	15.5	84.5	---	4.4	91.5	1.2	2.3	.5	8,730	15,720
W193983	1.2	15.2	79.0	4.6	4.5	86.4	1.1	2.9	.6	8,290	14,920
	---	15.4	80.0	4.7	4.4	87.4	1.1	1.9	.6	8,390	15,110
	---	16.1	83.9	---	4.6	91.7	1.2	1.9	.6	8,800	15,840
W193984	2.1	16.6	75.7	5.6	4.5	83.9	1.2	4.0	.7	8,120	14,620
	---	17.0	77.3	5.7	4.4	85.7	1.2	2.2	.7	8,290	14,930
	---	18.0	82.0	---	4.6	90.9	1.3	2.3	.8	8,800	15,840
W193985	2.0	16.5	76.3	5.2	4.5	84.0	1.2	4.4	.7	8,120	14,620
	---	16.8	77.9	5.3	4.4	85.7	1.2	2.7	.7	8,290	14,920
	---	17.8	82.2	---	4.6	90.5	1.3	2.8	.8	8,760	15,760
W193986	2.2	16.4	74.8	6.6	4.4	82.6	1.1	4.6	.6	7,970	14,350
	---	16.8	76.5	6.7	4.2	84.5	1.1	2.7	.6	8,150	14,680
	---	18.0	82.0	---	4.6	90.6	1.2	2.9	.7	8,740	15,740
W193987	3.2	15.6	76.4	4.8	4.5	83.7	1.2	5.1	.7	8,030	14,460
	---	16.1	78.9	5.0	4.3	86.5	1.2	2.3	.7	8,300	14,940
	---	17.0	83.0	---	4.5	91.0	1.3	2.5	.8	8,730	15,720
W193988	2.3	19.0	70.6	8.1	4.6	80.8	1.4	4.5	.7	7,820	14,070
	---	19.4	72.3	8.3	4.4	82.7	1.4	2.5	.7	8,000	14,400
	---	21.2	78.8	---	4.8	90.2	1.6	2.7	.8	8,730	15,710
W193992	3.1	18.6	75.9	2.4	5.0	85.1	1.5	5.3	.8	8,270	14,890
	---	19.2	78.3	2.5	4.8	87.8	1.5	2.6	.8	8,540	15,370
	---	19.7	80.3	---	4.9	90.1	1.6	2.7	.8	8,750	15,760
W193993	2.9	18.2	69.9	9.0	4.7	78.7	1.3	4.7	1.7	7,630	13,730
	---	18.7	72.0	9.3	4.5	81.1	1.3	2.2	1.8	7,860	14,140
	---	20.7	79.3	---	5.0	89.3	1.5	2.4	1.9	8,660	15,590
W193994	2.5	18.2	73.2	6.1	4.7	82.1	1.4	4.7	1.1	7,990	14,380
	---	18.7	75.1	6.3	4.5	84.2	1.4	2.5	1.1	8,190	14,750
	---	19.9	80.1	---	4.8	89.8	1.5	2.7	1.2	8,740	15,730
W193995	3.6	18.7	66.2	11.5	4.6	75.2	.9	6.3	1.5	7,330	13,190
	---	19.4	68.7	11.9	4.4	78.0	.9	3.2	1.6	7,600	13,680
	---	22.0	78.0	---	4.9	88.6	1.1	3.7	1.8	8,630	15,540
W193996	2.7	17.9	67.7	11.7	4.5	76.2	1.3	5.3	1.0	7,410	13,330
	---	18.4	69.6	12.0	4.3	78.3	1.3	3.0	1.0	7,610	13,700
	---	20.9	79.1	---	4.9	89.0	1.5	3.4	1.2	8,650	15,570

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w193982	0.5	B	B	B	3.5	1,390	1,450	1,500
	---	B	B	B				
	---	B	B	B				
w193983	.7	B	B	B	8.0	1,205	1,270	1,320
	---	B	B	B				
	---	B	B	B				
w193984	1.7	B	B	B	9.0	1,465	1,530	1,540
	---	B	B	B				
	---	B	B	B				
w193985	1.5	B	B	B	8.0	1,380	1,445	1,515
	---	B	B	B				
	---	B	B	B				
w193986	1.7	B	B	B	9.0	1,525	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193987	2.7	B	B	B	7.0	1,390	1,455	1,520
	---	B	B	B				
	---	B	B	B				
w193988	1.7	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193992	2.5	B	B	B	9.0	1,315	1,380	1,430
	---	B	B	B				
	---	B	B	B				
w193993	2.1	B	B	B	7.0	1,165	1,220	1,325
	---	B	B	B				
	---	B	B	B				
w193994	2.1	B	B	B	9.0	1,395	1,455	1,515
	---	B	B	B				
	---	B	B	B				
w193995	.0	B	B	B	9.0	1,400	1,465	1,505
	---	B	B	B				
	---	B	B	B				
w193996	.0	B	B	B	9.0	1,425	1,480	1,530
	---	B	B	B				
	---	B	B	B				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w193997	2.8	18.5	68.9	9.8	4.6	77.5	1.3	5.4	1.4	7,560	13,610
	---	19.0	70.9	10.1	4.4	79.7	1.3	3.0	1.4	7,780	14,000
	---	21.2	78.8	---	4.9	88.7	1.5	3.3	1.6	8,650	15,570
w193998	2.5	16.2	64.6	16.7	4.1	72.3	1.3	4.9	.7	6,980	12,570
	---	16.6	66.3	17.1	3.9	74.2	1.3	2.7	.7	7,160	12,890
	---	20.0	80.0	---	4.7	89.5	1.6	3.3	.9	8,640	15,560
w193999	1.0	18.2	77.4	3.4	4.6	86.1	1.5	3.5	.9	8,390	15,110
	---	18.4	78.2	3.4	4.5	87.0	1.5	2.6	.9	8,480	15,260
	---	19.0	81.0	---	4.7	90.1	1.6	2.7	.9	8,780	15,800
w194000	2.4	14.7	53.1	29.8	3.5	59.6	1.0	5.2	.8	5,770	10,390
	---	15.1	54.4	30.5	3.3	61.1	1.0	3.1	.8	5,910	10,650
	---	21.7	78.3	---	4.8	87.9	1.5	4.5	1.2	8,510	15,320
w194001	1.4	15.2	74.0	9.4	4.2	80.3	1.3	3.4	1.4	7,760	13,970
	---	15.4	75.1	9.5	4.1	81.4	1.3	2.2	1.4	7,870	14,170
	---	17.0	83.0	---	4.5	90.0	1.5	2.4	1.6	8,700	15,660
w194002	2.5	16.6	74.6	6.3	4.5	82.1	1.4	4.8	.9	7,980	14,370
	---	17.0	76.5	6.5	4.3	84.2	1.4	2.6	.9	8,190	14,730
	---	18.2	81.8	---	4.6	90.0	1.5	2.8	1.0	8,750	15,750
w194003	1.7	16.0	72.3	10.0	4.2	79.2	1.4	3.7	1.5	7,690	13,830
	---	16.3	73.6	10.2	4.1	80.6	1.4	2.2	1.5	7,820	14,070
	---	18.1	81.9	---	4.5	89.7	1.6	2.5	1.7	8,700	15,670
w194004	2.3	16.9	77.8	3.0	4.6	85.6	1.4	4.8	.6	8,320	14,980
	---	17.3	79.6	3.1	4.4	87.6	1.4	2.8	.6	8,520	15,330
	---	17.8	82.2	---	4.6	90.4	1.5	2.9	.6	8,790	15,820
w194005	2.6	18.6	76.2	2.6	4.6	85.8	1.6	4.5	.8	8,340	15,010
	---	19.1	78.2	2.7	4.4	88.1	1.6	2.2	.8	8,560	15,410
	---	19.6	80.4	---	4.5	90.5	1.7	2.3	.8	8,800	15,830
w194006	2.4	17.3	77.4	2.9	4.6	85.8	1.4	4.5	.7	8,300	14,940
	---	17.7	79.3	3.0	4.4	87.9	1.4	2.4	.7	8,510	15,310
	---	18.3	81.7	---	4.6	90.6	1.5	2.5	.7	8,770	15,780
w194007	1.7	18.0	76.7	3.6	4.7	85.8	1.5	3.8	.6	8,320	14,980
	---	18.3	78.0	3.7	4.6	87.3	1.5	2.3	.6	8,470	15,240
	---	19.0	81.0	---	4.8	90.6	1.6	2.4	.6	8,790	15,820
w194008	2.1	17.9	77.7	2.3	4.8	86.2	1.5	4.6	.6	8,370	15,070
	---	18.3	79.4	2.3	4.7	88.0	1.5	2.8	.6	8,550	15,390
	---	18.7	81.3	---	4.8	90.2	1.6	2.9	.6	8,760	15,760

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w193997	0.0	B	B	B	9.0	1,420	1,480	1,530
	---	B	B	B				
	---	B	B	B				
w193998	1.6	B	B	B	9.0	1,505	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w193999	.4	B	B	B	9.0	1,265	1,325	1,380
	---	B	B	B				
	---	B	B	B				
w194000	1.4	B	B	B	5.0	1,510	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194001	.6	B	B	B	5.0	1,345	1,405	1,455
	---	B	B	B				
	---	B	B	B				
w194002	1.6	B	B	B	8.5	1,345	1,405	1,455
	---	B	B	B				
	---	B	B	B				
w194003	.7	B	B	B	7.0	1,350	1,400	1,465
	---	B	B	B				
	---	B	B	B				
w194004	1.6	B	B	B	8.5	1,340	1,400	1,455
	---	B	B	B				
	---	B	B	B				
w194005	1.7	B	B	B	9.0	1,235	1,290	1,345
	---	B	B	B				
	---	B	B	B				
w194006	1.7	B	B	B	8.0	1,490	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194007	.9	B	B	B	9.0	1,385	1,435	1,495
	---	B	B	B				
	---	B	B	B				
w194008	1.3	B	B	B	9.0	1,235	1,295	1,345
	---	B	B	B				
	---	B	B	B				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
w194009	1.8	19.9	75.3	3.0	4.6	86.3	1.4	4.1	0.6	8,360	15,060
	---	20.3	76.7	3.1	4.5	87.9	1.4	2.5	.6	8,520	15,330
	---	20.9	79.1	---	4.6	90.7	1.5	2.6	.6	8,790	15,820
w194010	3.3	17.4	70.4	8.9	4.7	79.5	1.2	5.2	.6	7,710	13,870
	---	18.0	72.8	9.2	4.5	82.2	1.2	2.3	.6	7,970	14,350
	---	19.8	80.2	---	4.9	90.5	1.4	2.6	.7	8,780	15,800
w194011	1.0	15.1	77.3	6.6	4.2	84.3	1.2	3.2	.5	8,060	14,510
	---	15.3	78.1	6.7	4.1	85.2	1.2	2.3	.5	8,140	14,660
	---	16.3	83.7	---	4.4	91.2	1.3	2.5	.5	8,720	15,700
w194012	2.0	15.7	49.3	33.0	3.6	56.9	1.0	4.7	.8	5,550	10,000
	---	16.0	50.3	33.7	3.4	58.1	1.0	3.0	.8	5,670	10,200
	---	24.2	75.8	---	5.2	87.5	1.5	4.5	1.2	8,550	15,380
w194013	2.3	13.8	36.3	47.6	2.9	43.1	.8	5.0	.6	4,170	7,510
	---	14.1	37.2	48.7	2.7	44.1	.8	3.0	.6	4,270	7,690
	---	27.5	72.5	---	5.3	86.0	1.6	5.9	1.2	8,330	14,990
w194014	2.6	16.7	57.7	23.0	4.0	66.1	1.1	4.8	1.0	6,420	11,560
	---	17.1	59.2	23.6	3.8	67.9	1.1	2.6	1.0	6,600	11,870
	---	22.4	77.6	---	5.0	88.8	1.5	3.3	1.3	8,640	15,540
w194015	2.3	17.1	62.7	17.9	4.1	71.8	1.2	4.0	1.1	6,980	12,560
	---	17.5	64.2	18.3	3.9	73.5	1.2	2.0	1.1	7,140	12,860
	---	21.4	78.6	---	4.8	90.0	1.5	2.5	1.4	8,750	15,740
w194016	2.5	15.7	75.1	6.7	4.3	82.9	1.1	4.5	.5	7,970	14,340
	---	16.1	77.0	6.9	4.1	85.0	1.1	2.3	.5	8,170	14,710
	---	17.3	82.7	---	4.4	91.3	1.2	2.5	.6	8,770	15,790
w194017	1.9	16.1	74.1	7.9	4.2	82.5	1.1	3.7	.6	7,920	14,260
	---	16.4	75.5	8.1	4.1	84.1	1.1	2.1	.6	8,080	14,540
	---	17.8	82.2	---	4.4	91.5	1.2	2.2	.7	8,780	15,810
w194018	2.5	16.4	75.4	5.7	4.4	84.0	1.2	4.0	.6	8,100	14,580
	---	16.8	77.3	5.8	4.2	86.2	1.2	1.8	.6	8,310	14,960
	---	17.9	82.1	---	4.5	91.5	1.3	1.9	.7	8,830	15,890
w194019	2.3	17.1	74.2	6.4	4.5	83.5	1.3	3.6	.8	8,110	14,600
	---	17.5	75.9	6.6	4.3	85.5	1.3	1.6	.8	8,300	14,950
	---	18.7	81.3	---	4.6	91.5	1.4	1.7	.9	8,890	16,000
w194020	1.9	17.6	69.0	11.5	4.3	78.7	1.2	3.2	1.2	7,590	13,670
	---	17.9	70.3	11.7	4.2	80.2	1.2	1.5	1.2	7,740	13,930
	---	20.3	79.7	---	4.7	90.9	1.4	1.7	1.4	8,770	15,780

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Air-dried loss	Forms of sulfur: Sulfate	Forms of sulfur: Pyritic	Forms of sulfur: Organic	Free swelling	Ash fusion temperature C: Initial deform.	Ash fusion temperature C: soften.	Ash fusion temperature C: fluid
w194009	1.0	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194010	2.7	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194011	.6	B	B	B	.0	1,235	1,290	1,345
	---	B	B	B				
	---	B	B	B				
w194012	1.4	B	B	B	8.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194013	1.5	B	B	B	3.0	1,490	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194014	2.0	B	B	B	8.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194015	1.6	B	B	B	8.5	1,395	1,455	1,515
	---	B	B	B				
	---	B	B	B				
w194016	1.8	B	B	B	7.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194017	1.3	B	B	B	8.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194018	1.8	B	B	B	7.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194019	1.5	B	B	B	9.0	1,435	1,490	1,540
	---	B	B	B				
	---	B	B	B				
w194020	1.3	B	B	B	9.0	1,380	1,430	1,490
	---	B	B	B				
	---	B	B	B				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w194021	2.7	18.9	71.8	6.6	4.8	81.3	1.4	5.3	0.6	7,890	14,210
	---	19.4	73.8	6.8	4.6	83.6	1.4	3.0	.6	8,110	14,600
	---	20.8	79.2	---	5.0	89.6	1.5	3.2	.7	8,700	15,670
w199324	2.1	40.9	55.1	1.9	5.8	80.4	1.6	9.3	1.0	8,030	14,460
	---	41.8	56.3	1.9	5.7	82.1	1.6	7.6	1.0	8,200	14,770
	---	42.6	57.4	---	5.8	83.7	1.7	7.7	1.0	8,370	15,060
w199325	1.8	38.5	57.2	2.5	5.5	80.9	1.5	8.8	.7	8,010	14,420
	---	39.2	58.2	2.5	5.4	82.4	1.5	7.3	.7	8,160	14,690
	---	40.2	59.8	---	5.5	84.5	1.6	7.5	.7	8,370	15,070
w199326	2.1	34.6	53.1	10.2	5.2	73.6	1.0	9.5	.6	7,220	13,000
	---	35.3	54.2	10.4	5.1	75.2	1.0	7.8	.6	7,380	13,280
	---	39.5	60.5	---	5.7	83.9	1.1	8.7	.7	8,240	14,830
w199327	1.9	43.1	49.1	5.9	5.5	76.0	1.5	9.1	2.0	7,670	13,800
	---	43.9	50.1	6.0	5.4	77.5	1.5	7.6	2.0	7,820	14,070
	---	46.7	53.3	---	5.7	82.4	1.6	8.0	2.2	8,320	14,970
w199328	2.0	43.8	51.0	3.2	5.8	79.2	1.6	9.5	.7	7,900	14,210
	---	44.7	52.0	3.3	5.7	80.8	1.6	7.9	.7	8,060	14,500
	---	46.2	53.8	---	5.9	83.5	1.7	8.1	.7	8,330	14,990
w199329	2.0	40.7	48.9	8.4	5.3	73.2	1.3	7.6	4.1	7,370	13,270
	---	41.5	49.9	8.6	5.2	74.7	1.3	5.9	4.2	7,520	13,540
	---	45.4	54.6	---	5.7	81.7	1.5	6.5	4.6	8,230	14,810
w199330	1.8	40.7	47.7	9.8	5.2	71.6	1.4	8.7	3.2	7,230	13,010
	---	41.4	48.6	10.0	5.1	72.9	1.4	7.2	3.3	7,360	13,250
	---	46.0	54.0	---	5.7	81.0	1.6	8.0	3.6	8,170	14,710
w199331	1.4	39.4	47.2	12.0	5.2	72.8	1.1	8.1	.7	7,320	13,180
	---	40.0	47.9	12.2	5.1	73.8	1.1	7.0	.7	7,420	13,360
	---	45.5	54.5	---	5.8	84.1	1.3	7.9	.8	8,450	15,210
w199332	3.5	37.4	54.4	4.7	5.5	76.6	1.5	11.1	.7	7,580	13,650
	---	38.8	56.4	4.9	5.3	79.4	1.6	8.3	.7	7,860	14,150
	---	40.7	59.3	---	5.6	83.4	1.6	8.7	.8	8,260	14,870
w199000	2.7	29.6	62.3	5.4	5.4	80.5	1.4	6.6	.7	7,990	14,380
	---	30.4	64.0	5.5	5.2	82.7	1.4	4.3	.7	8,210	14,780
	---	32.2	67.8	---	5.5	87.6	1.5	4.6	.8	8,690	15,650
w199001	2.2	30.0	61.4	6.4	5.4	80.3	1.4	5.9	.7	7,930	14,270
	---	30.7	62.8	6.5	5.3	82.1	1.4	4.0	.7	8,110	14,590
	---	32.8	67.2	---	5.6	87.9	1.5	4.3	.8	8,670	15,610

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w194021	0.0	B	B	B	9.0	1,540	1,600	1,600G
	---	B	B	B				
	---	B	B	B				
w199324	.3	.02	.25	75	7.0	1,240	1,265	1,365
	---	.02	.26	.77				
	---	.02	.26	.78				
w199325	.0	.02	.05	.66	7.0	1,600	1,600G	1,600G
	---	.02	.05	.67				
	---	.02	.05	.69				
w199326	.3	.02	.04	.56	6.0	1,600	1,600G	1,600G
	---	.02	.04	.57				
	---	.02	.05	.64				
w199327	.5	.01	1.48	.49	5.0	1,170	1,230	1,350
	---	.01	1.51	.50				
	---	.01	1.61	.53				
w199328	.4	.00	.04	.61	5.0	1,600	1,600G	1,600G
	---	.00	.04	.62				
	---	.00	.04	.64				
w199329	.3	.02	3.53	.56	6.0	1,165	1,230	1,350
	---	.02	3.60	.57				
	---	.02	3.94	.62				
w199330	.3	.04	2.77	.41	5.0	1,140	1,165	1,230
	---	.04	2.82	.42				
	---	.05	3.13	.46				
w199331	.0	.02	.10	.55	3.0	1,600	1,600G	1,600G
	---	.02	.10	.56				
	---	.02	.12	.64				
w199332	1.6	.02	.08	.62	6.0	1,600	1,600G	1,600G
	---	.02	.08	.64				
	---	.02	.09	.68				
w199000	.0	.01	.17	.54	9.0	1,540	1,540	1,540
	---	.01	.17	.55				
	---	.01	.18	.59				
w199001	.0	.01	.18	.49	9.0	1,540	1,540	1,540
	---	.01	.18	.50				
	---	.01	.20	.54				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Proximate Analysis: Moisture	Volatile matter	Fixed carbon	Ash	Ultimate Analysis: Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Heat of Combustion: Kcal/kg	Btu/lb
W199002	5.4	25.7	61.3	7.6	5.0	74.8	1.4	10.3	0.9	7,300	13,140
	---	27.2	64.8	8.0	4.7	79.1	1.5	5.8	1.0	7,720	13,890
	---	29.5	70.5	---	5.1	86.0	1.6	6.3	1.0	8,390	15,100
W199003	4.3	25.8	59.9	10.0	5.0	74.4	1.4	8.6	.6	7,300	13,130
	---	27.0	62.6	10.4	4.7	77.7	1.5	5.0	.6	7,630	13,730
	---	30.1	69.9	---	5.3	86.8	1.6	5.6	.7	8,510	15,330
W199004	21.0	27.6	40.2	11.2	4.9	53.0	.9	29.5	.5	4,810	8,650
	---	34.9	50.9	14.2	3.2	67.1	1.1	13.7	.6	6,090	10,950
	---	40.7	59.3	---	3.8	78.2	1.3	16.0	.7	7,090	12,760
W199005	2.0	32.1	61.8	4.1	5.2	81.7	1.3	7.0	.8	8,030	14,460
	---	32.8	63.1	4.2	5.1	83.4	1.3	5.3	.8	8,200	14,750
	---	34.2	65.8	---	5.3	87.0	1.4	5.6	.9	8,550	15,400
W199006	5.8	29.6	56.8	7.8	5.2	73.4	1.3	11.4	.9	7,210	12,970
	---	31.4	60.3	8.3	4.8	77.9	1.4	6.6	1.0	7,650	13,770
	---	34.3	65.7	---	5.3	85.0	1.5	7.2	1.0	8,340	15,020
W199007	3.5	30.2	59.7	6.6	5.3	78.1	1.5	7.7	.8	7,710	13,890
	---	31.3	61.9	6.8	5.1	80.9	1.6	4.8	.8	7,990	14,390
	---	33.6	66.4	---	5.5	86.9	1.7	5.1	.9	8,580	15,450
W199008	6.0	25.3	53.9	14.8	4.8	68.4	1.0	10.4	.7	6,690	12,040
	---	26.9	57.3	15.7	4.4	72.8	1.1	5.4	.7	7,120	12,810
	---	31.9	68.1	---	5.2	86.4	1.3	6.4	.9	8,450	15,210
W199009	3.5	15.5	66.7	14.3	4.9	71.4	1.0	7.6	.8	6,980	12,570
	---	16.1	69.1	14.8	4.7	74.0	1.0	4.7	.8	7,240	13,030
	---	18.9	81.1	---	5.5	86.9	1.2	5.5	1.0	8,500	15,290
W199011	6.3	27.0	60.9	5.8	5.3	75.2	1.5	11.5	.8	7,340	13,210
	---	28.8	65.0	6.2	4.9	80.3	1.6	6.3	.9	7,830	14,100
	---	30.7	69.3	---	5.2	85.6	1.7	6.7	.9	8,350	15,030
W199012	6.7	27.9	60.3	5.1	5.3	75.1	1.5	12.1	.8	7,330	13,190
	---	29.9	64.6	5.5	4.9	80.5	1.6	6.6	.9	7,850	14,130
	---	31.6	68.4	---	5.2	85.1	1.7	7.0	.9	8,310	14,950
W199013	20.0	23.5	49.2	7.3	5.9	62.2	1.1	23.0	.4	5,920	10,650
	---	29.4	61.5	9.1	4.6	77.7	1.4	6.5	.5	7,400	13,320
	---	32.3	67.7	---	5.1	85.6	1.5	7.2	.6	8,140	14,650
W199014	32.3	22.5	37.9	7.3	5.9	45.2	.7	40.4	.4	4,020	7,240
	---	33.2	56.0	10.8	3.4	66.8	1.0	17.3	.6	5,940	10,700
	---	37.3	62.7	---	3.8	74.8	1.2	19.4	.7	6,660	11,990

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w199002	0.0	0.01	0.16	0.68	4.0	1,540	1,540	1,540
	---	.01	.17	.72				
	---	.01	.18	.78				
w199003	.0	.01	.17	.46	7.0	1,540	1,540	1,540
	---	.01	.18	.48				
	---	.01	.20	.54				
w199004	.0	.01	.25	.22	.0	1,260	1,325	1,380
	---	.01	.32	.28				
	---	.01	.37	.32				
w199005	.0	.01	.26	.50	9.0	1,390	1,440	1,495
	---	.01	.27	.51				
	---	.01	.28	.53				
w199006	.0	.01	.22	.66	8.0	1,465	1,515	1,540
	---	.01	.23	.70				
	---	.01	.25	.76				
w199007	.0	.01	.19	.57	9.0	1,540	1,540	1,540
	---	.01	.20	.59				
	---	.01	.21	.63				
w199008	.0	.01	.16	.48	8.0	1,540	1,540	1,540
	---	.01	.17	.51				
	---	.01	.20	.61				
w199009	.0	.01	.29	.47	9.0	1,540	1,540	1,540
	---	.01	.30	.49				
	---	.01	.35	.57				
w199011	.0	.01	.19	.56	4.0	1,320	1,375	1,435
	---	.01	.20	.60				
	---	.01	.22	.64				
w199012	.0	.01	.19	.57	3.0	1,280	1,350	1,415
	---	.01	.20	.61				
	---	.01	.22	.65				
w199013	.0	.01	.05	.39	2.0	1,155	1,180	1,240
	---	.01	.06	.49				
	---	.01	.07	.54				
w199014	.0	.00	.04	.37	.0	1,400	1,455	1,600
	---	.00	.06	.55				
	---	.00	.07	.61				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w199015	10.3	26.0	58.8	4.9	5.2	71.4	1.1	16.9	0.5	6,840	12,310
	---	29.0	65.6	5.5	4.5	79.6	1.2	8.6	.6	7,630	13,730
	---	30.7	69.3	---	4.8	84.2	1.3	9.1	.6	8,070	14,520
w199016	11.3	24.4	56.5	7.8	5.2	69.0	1.1	16.2	.6	6,600	11,870
	---	27.5	63.7	8.8	4.4	77.8	1.2	6.9	.7	7,440	13,390
	---	30.2	69.8	---	4.9	85.3	1.4	7.6	.7	8,150	14,680
w199017	8.1	26.4	58.8	6.7	5.3	74.6	1.3	11.6	.6	7,280	13,110
	---	28.7	64.0	7.3	4.8	81.2	1.4	4.8	.7	7,930	14,270
	---	31.0	69.0	---	5.2	87.6	1.5	5.2	.7	8,550	15,390
w199018	24.5	25.6	40.7	9.2	5.3	50.6	.9	33.5	.5	4,520	8,140
	---	33.9	53.9	12.2	3.4	67.0	1.2	15.5	.7	5,990	10,790
	---	38.6	61.4	---	3.9	76.3	1.4	17.7	.8	6,830	12,290
w199019	3.0	30.5	63.3	3.2	5.3	81.4	1.3	7.7	1.1	8,150	14,660
	---	31.4	65.3	3.3	5.1	83.9	1.3	5.2	1.1	8,400	15,120
	---	32.5	67.5	---	5.3	86.8	1.4	5.4	1.2	8,690	15,630
w199022	3.3	27.9	59.7	9.1	5.1	74.7	1.4	8.8	1.0	7,430	13,370
	---	28.9	61.7	9.4	4.9	77.2	1.4	6.1	1.0	7,680	13,830
	---	31.8	68.2	---	5.4	85.3	1.6	6.7	1.1	8,480	15,270
w199023	3.1	29.6	60.8	6.5	5.2	78.0	1.5	7.9	.9	7,710	13,870
	---	30.5	62.7	6.7	5.0	80.5	1.5	5.3	.9	7,950	14,320
	---	32.7	67.3	---	5.4	86.3	1.7	5.7	1.0	8,530	15,350
w199024	4.6	27.9	61.8	5.7	5.0	76.0	1.3	11.2	.8	7,350	13,230
	---	29.2	64.8	6.0	4.7	79.7	1.4	7.5	.8	7,700	13,860
	---	31.1	68.9	---	5.0	84.7	1.4	7.9	.9	8,190	14,740
w199418	1.8	31.7	50.8	15.7	4.7	68.6	1.2	9.0	.7	6,710	12,080
	---	32.3	51.7	16.0	4.6	69.9	1.2	7.5	.7	6,830	12,300
	---	38.4	61.6	---	5.5	83.2	1.5	9.0	.8	8,130	14,640
w199419	1.6	35.4	51.4	11.6	5.1	72.8	1.4	8.6	.6	7,190	12,930
	---	36.0	52.2	11.8	5.0	74.0	1.4	7.3	.6	7,300	13,150
	---	40.8	59.2	---	5.7	83.9	1.6	8.3	.7	8,280	14,900
w199420	1.5	35.2	52.2	11.1	5.0	73.0	1.4	8.4	1.1	7,170	12,910
	---	35.7	53.0	11.3	4.9	74.1	1.4	7.2	1.1	7,280	13,110
	---	40.3	59.7	---	5.5	83.5	1.6	8.1	1.3	8,210	14,770
w199421	2.9	39.7	50.5	6.9	5.5	73.3	1.4	11.5	1.5	7,300	13,150
	---	40.9	52.0	7.1	5.3	75.5	1.4	9.2	1.5	7,520	13,540
	---	44.0	56.0	---	5.7	81.3	1.6	9.9	1.7	8,100	14,580

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Air-dried loss	Forms of sulfur Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C Initial deform.	soften.	fluid
w199015	0.0	0.02	0.04	0.47	1.0	1,600	1,600G	1,600G
	---	.02	.04	.52				
	---	.02	.05	.55				
w199016	.0	.01	.03	.54	1.0	1,600	1,600G	1,600G
	---	.01	.03	.61				
	---	.01	.04	.67				
w199017	.0	.01	.10	.50	9.0	1,600	1,600G	1,600G
	---	.01	.11	.54				
	---	.01	.12	.59				
w199018	.0	.00	.08	.37	.0	1,195	1,250	1,370
	---	.00	.11	.49				
	---	.00	.12	.56				
w199019	.0	.00	.52	.54	9.0	1,205	1,300	1,395
	---	.00	.54	.56				
	---	.00	.55	.58				
w199022	.0	.01	.30	.67	8.0	1,600	1,600G	1,600G
	---	.01	.31	.69				
	---	.01	.34	.76				
w199023	.0	.00	.23	.62	8.0	1,600	1,600G	1,600G
	---	.00	.24	.64				
	---	.00	.25	.69				
w199024	.0	.00	.04	.74	2.0	1,440	1,495	1,600
	---	.00	.04	.78				
	---	.00	.04	.82				
w199418	.1	.02	.10	.60	1.5	1,600	1,600G	1,600G
	---	.02	.10	.61				
	---	.02	.12	.73				
w199419	.0	.02	.03	.53	4.5	1,600	1,600G	1,600G
	---	.02	.03	.54				
	---	.02	.03	.61				
w199420	.1	.01	.51	.61	3.5	1,600	1,600G	1,600G
	---	.01	.52	.62				
	---	.01	.58	.70				
w199421	.0	.06	.67	.73	4.0	1,320	1,390	1,555
	---	.06	.69	.75				
	---	.07	.74	.81				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w199422	0.7	39.0	51.4	8.9	5.1	75.4	1.5	5.8	3.3	7,600	13,670
	---	39.3	51.8	9.0	5.1	75.9	1.5	5.2	3.3	7,650	13,770
	---	43.1	56.9	---	5.6	83.4	1.7	5.7	3.7	8,400	15,120
w199425	1.7	33.6	51.8	12.9	5.0	71.8	1.3	8.2	.7	7,010	12,610
	---	34.2	52.7	13.1	4.9	73.0	1.3	6.8	.7	7,130	12,830
	---	39.3	60.7	---	5.6	84.1	1.5	7.8	.8	8,210	14,770
w201530	1.9	30.5	36.1	31.5	4.3	53.0	1.0	9.4	.8	5,230	9,420
	---	31.1	36.8	32.1	4.2	54.0	1.0	7.9	.8	5,330	9,600
	---	45.8	54.2	---	6.1	79.6	1.5	11.6	1.2	7,860	14,140
w201531	3.3	32.4	44.2	20.1	4.9	62.2	1.1	10.4	1.3	6,130	11,040
	---	33.5	45.7	20.8	4.7	64.3	1.1	7.7	1.3	6,340	11,420
	---	42.3	57.7	---	5.9	81.2	1.4	9.7	1.7	8,010	14,420
w201532	3.3	32.2	41.4	23.1	4.7	59.2	.7	11.6	.9	5,800	10,450
	---	33.3	42.8	23.9	4.5	61.2	.7	9.0	.9	6,000	10,800
	---	43.7	56.2	---	5.9	80.4	1.0	11.8	1.2	7,890	14,190
w201533	10.3	31.6	49.7	8.4	4.8	60.8	1.2	24.4	.4	5,530	9,960
	---	35.2	55.4	9.4	4.1	67.8	1.3	17.0	.4	6,170	11,110
	---	38.9	61.1	---	4.5	74.8	1.5	18.8	.5	6,810	12,250
w201534	4.1	39.0	52.7	4.2	5.7	76.1	1.3	10.5	2.1	7,560	13,600
	---	40.7	55.0	4.4	5.5	79.4	1.4	7.1	2.2	7,880	14,180
	---	42.5	57.5	---	5.7	83.0	1.4	7.5	2.3	8,240	14,830
w194951	4.4	36.3	53.5	5.8	5.6	74.2	1.3	11.6	1.5	7,420	13,360
	---	38.0	56.0	6.1	5.3	77.6	1.4	8.0	1.6	7,760	13,970
	---	40.4	59.6	---	5.7	82.6	1.4	8.6	1.7	8,270	14,880
w194952	2.8	29.4	52.5	15.3	4.7	69.7	1.2	7.2	1.8	6,890	12,410
	---	30.2	54.0	15.7	4.5	71.7	1.2	4.8	1.9	7,090	12,770
	---	35.9	64.1	---	5.4	85.1	1.5	5.8	2.2	8,420	15,150
w194953	1.6	30.6	48.1	19.7	4.6	66.8	1.4	6.1	1.5	6,690	12,040
	---	31.1	48.9	20.0	4.5	67.9	1.4	4.8	1.5	6,800	12,230
	---	38.9	61.1	---	5.6	84.9	1.8	5.9	1.9	8,500	15,290
w194954	1.9	30.6	52.8	14.7	5.0	70.1	1.4	5.1	3.6	7,040	12,680
	---	31.2	53.8	15.0	4.9	71.5	1.4	3.5	3.7	7,180	12,920
	---	36.7	63.3	---	5.7	84.1	1.7	4.1	4.3	8,440	15,200
w194956	4.8	29.7	52.5	13.0	5.0	68.8	1.3	11.3	.6	6,750	12,140
	---	31.2	55.1	13.7	4.7	72.3	1.4	7.4	.6	7,090	12,760
	---	36.1	63.9	---	5.4	83.7	1.6	8.6	.7	8,210	14,770

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Air-dried loss	Forms of sulfur Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C Initial deform.	soften.	fluid
w199422	0.2	0.06	1.31	1.95	8.5	1,140	1,205	1,320
	---	.06	1.32	1.96				
	---	.07	1.45	2.16				
w199425	.1	.01	.13	.59	3.0	1,600	1,600G	1,600G
	---	.01	.13	.60				
	---	.01	.15	.69				
w201530	.1	.03	.40	.42	1.0	1,600	1,600G	1,600G
	---	.03	.41	.43				
	---	.05	.60	.63				
w201531	.3	.04	.66	.61	2.5	1,600	1,600G	1,600G
	---	.04	.68	.63				
	---	.05	.86	.80				
w201532	.2	.03	.37	.45	1.0	1,600	1,600G	1,600G
	---	.03	.38	.47				
	---	.04	.50	.61				
w201533	.2	.04	.05	.35	.0	1,195	1,250	1,390
	---	.04	.06	.39				
	---	.05	.06	.43				
w201534	1.0	.07	1.30	.70	4.5	1,145	1,250	1,390
	---	.07	1.36	.73				
	---	.08	1.42	.76				
w194951	.0	B	B	B	7.5	1,060	1,125	1,305
	---	B	B	B				
	---	B	B	B				
w194952	1.4	B	B	B	7.5	1,395	1,450	1,515
	---	B	B	B				
	---	B	B	B				
w194953	.5	B	B	B	8.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194954	.6	B	B	B	9.0	1,165	1,230	1,290
	---	B	B	B				
	---	B	B	B				
w194956	2.9	B	B	B	1.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
W194957	3.3	31.3	51.1	14.3	5.0	69.7	1.3	9.0	0.7	6,880	12,390
	---	32.4	52.8	14.8	4.8	72.1	1.3	6.3	.7	7,120	12,810
	---	38.0	62.0	---	5.6	84.6	1.6	7.4	.8	8,350	15,030
W194958	2.7	36.4	54.9	6.0	5.6	77.3	1.6	9.1	.4	7,780	14,000
	---	37.4	56.4	6.2	5.4	79.4	1.6	6.9	.4	8,000	14,390
	---	39.9	60.1	---	5.8	84.7	1.8	7.3	.4	8,520	15,340
W194959	1.5	36.5	54.6	7.4	5.3	76.5	1.5	7.6	1.6	7,760	13,970
	---	37.1	55.4	7.5	5.2	77.7	1.5	6.4	1.6	7,880	14,180
	---	40.1	59.9	---	5.6	84.0	1.6	6.9	1.8	8,520	15,330
W194960	2.7	37.1	51.7	8.5	5.4	74.3	1.3	6.9	3.6	7,510	13,510
	---	38.1	53.1	8.7	5.2	76.4	1.3	4.6	3.7	7,710	13,890
	---	41.8	58.2	---	5.7	83.7	1.5	5.1	4.1	8,450	15,220
W194961	1.9	35.5	53.9	8.7	5.3	75.0	1.3	7.8	2.0	7,510	13,510
	---	36.2	54.9	8.9	5.2	76.5	1.3	6.2	2.0	7,650	13,770
	---	39.7	60.3	---	5.7	83.9	1.5	6.8	2.2	8,400	15,110
W194962	3.3	35.2	55.2	6.3	5.4	76.6	1.4	7.2	3.2	7,590	13,650
	---	36.4	57.1	6.5	5.2	79.2	1.4	4.4	3.3	7,840	14,120
	---	38.9	61.1	---	5.6	84.7	1.5	4.7	3.5	8,390	15,100
W194963	3.5	38.1	47.7	10.7	5.3	71.6	1.3	7.1	4.0	7,280	13,100
	---	39.5	49.4	11.1	5.1	74.2	1.3	4.1	4.1	7,540	13,580
	---	44.4	55.6	---	5.7	83.4	1.5	4.6	4.7	8,480	15,270
W194964	2.7	36.3	51.6	9.4	5.2	73.3	1.2	7.7	3.2	7,380	13,290
	---	37.3	53.0	9.7	5.0	75.3	1.2	5.4	3.3	7,590	13,660
	---	41.3	58.7	---	5.6	83.4	1.4	6.0	3.6	8,400	15,120
W194965	3.0	37.1	50.5	9.4	5.3	72.4	1.3	6.8	4.8	7,380	13,280
	---	38.2	52.1	9.7	5.1	74.6	1.3	4.3	4.9	7,600	13,690
	---	42.4	57.6	---	5.7	82.6	1.5	4.7	5.5	8,420	15,160
W194966	3.1	35.7	48.8	12.4	5.0	70.7	1.2	7.6	3.2	7,040	12,680
	---	36.8	50.4	12.8	4.8	73.0	1.2	5.0	3.3	7,270	13,090
	---	42.2	57.8	---	5.5	83.7	1.4	5.7	3.8	8,340	15,010
W194967	2.2	35.9	49.8	12.1	5.1	71.1	1.3	7.5	3.0	7,170	12,910
	---	36.7	50.9	12.4	5.0	72.7	1.3	5.7	3.1	7,340	13,210
	---	41.9	58.1	---	5.7	83.0	1.5	6.5	3.5	8,370	15,070
W194968	3.6	35.4	54.6	6.4	5.4	75.0	1.4	10.0	1.7	7,530	13,550
	---	36.7	56.6	6.6	5.2	77.8	1.5	7.1	1.8	7,810	14,060
	---	39.3	60.7	---	5.6	83.3	1.6	7.6	1.9	8,370	15,060

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Air-dried loss	Forms of sulfur Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C Initial deform.	soften.	fluid
w194957	1.7	B	B	B	8.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194958	1.4	B	B	B	9.0	1,180	1,230	1,290
	---	B	B	B				
	---	B	B	B				
w194959	.4	B	B	B	9.0	1,125	1,180	1,240
	---	B	B	B				
	---	B	B	B				
w194960	1.2	B	B	B	9.0	1,180	1,235	1,295
	---	B	B	B				
	---	B	B	B				
w194961	.4	B	B	B	9.0	1,150	1,210	1,290
	---	B	B	B				
	---	B	B	B				
w194962	1.7	B	B	B	9.0	1,335	1,395	1,455
	---	B	B	B				
	---	B	B	B				
w194963	2.3	B	B	B	8.0	1,070	1,125	1,175
	---	B	B	B				
	---	B	B	B				
w194964	1.2	B	B	B	9.0	1,120	1,175	1,235
	---	B	B	B				
	---	B	B	B				
w194965	1.6	B	B	B	9.0	1,070	1,125	1,190
	---	B	B	B				
	---	B	B	B				
w194966	1.8	B	B	B	8.5	1,110	1,155	1,220
	---	B	B	B				
	---	B	B	B				
w194967	.9	B	B	B	9.0	1,200	1,265	1,320
	---	B	B	B				
	---	B	B	B				
w194968	1.7	B	B	B	9.0	1,265	1,320	1,380
	---	B	B	B				
	---	B	B	B				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w194969	1.0	37.7	53.8	7.5	5.5	77.9	1.6	5.7	1.8	7,840	14,110
	---	38.1	54.3	7.6	5.4	78.7	1.6	4.9	1.8	7,920	14,260
	---	41.2	58.8	---	5.9	85.1	1.7	5.3	2.0	8,570	15,430
w194970	3.1	34.8	54.1	8.0	5.2	74.3	1.3	8.3	2.8	7,480	13,460
	---	35.9	55.8	8.3	5.0	76.7	1.3	5.7	2.9	7,710	13,890
	---	39.1	60.9	---	5.5	83.6	1.5	6.2	3.1	8,410	15,130
w194971	2.3	32.9	51.8	13.0	5.0	71.1	1.3	7.0	2.6	7,120	12,820
	---	33.7	53.0	13.3	4.9	72.8	1.3	5.1	2.7	7,290	13,120
	---	38.8	61.2	---	5.6	83.9	1.5	5.9	3.1	8,410	15,130
w194972	2.8	35.6	54.3	7.3	5.4	76.1	1.3	8.3	1.7	7,610	13,700
	---	36.6	55.9	7.5	5.2	78.3	1.3	6.0	1.7	7,830	14,090
	---	39.6	60.4	---	5.7	84.6	1.4	6.5	1.9	8,460	15,230
w194973	2.8	35.4	55.7	6.1	5.4	77.2	1.5	9.0	.9	7,700	13,850
	---	36.4	57.3	6.3	5.2	79.4	1.5	6.7	.9	7,920	14,250
	---	38.9	61.1	---	5.6	84.7	1.6	7.1	1.0	8,450	15,210
w194974	1.7	42.0	49.6	6.7	5.6	76.0	1.1	7.5	3.2	7,730	13,910
	---	42.7	50.5	6.8	5.5	77.3	1.1	6.1	3.3	7,860	14,150
	---	45.9	54.1	---	5.9	83.0	1.2	6.5	3.5	8,430	15,180
w194975	2.4	34.6	55.3	7.7	5.3	76.3	1.3	7.8	1.6	7,590	13,670
	---	35.5	56.7	7.9	5.2	78.2	1.3	5.8	1.6	7,780	14,000
	---	38.5	61.5	---	5.6	84.9	1.4	6.3	1.8	8,450	15,200
w194976	2.5	37.6	49.8	10.1	5.3	73.1	1.3	7.4	2.7	7,360	13,240
	---	38.6	51.1	10.4	5.2	75.0	1.3	5.3	2.8	7,540	13,580
	---	43.0	57.0	---	5.7	83.6	1.5	5.9	3.1	8,420	15,150
w194977	2.1	38.4	53.1	6.4	5.4	77.1	1.4	8.0	1.8	7,730	13,920
	---	39.2	54.2	6.5	5.3	78.8	1.4	6.3	1.8	7,900	14,220
	---	42.0	58.0	---	5.6	84.3	1.5	6.7	2.0	8,450	15,210
w194978	3.5	34.9	45.5	16.1	4.9	65.8	1.1	8.0	4.0	6,700	12,060
	---	36.2	47.2	16.7	4.7	68.2	1.1	5.1	4.1	6,940	12,500
	---	43.4	56.6	---	5.6	81.8	1.4	6.1	5.0	8,330	15,000
w194979	4.3	36.6	48.0	11.1	5.2	69.3	1.1	11.1	2.2	6,950	12,510
	---	38.2	50.2	11.6	4.9	72.4	1.1	7.6	2.3	7,260	13,070
	---	43.3	56.7	---	5.6	81.9	1.3	8.6	2.6	8,210	14,780
w194980	1.9	40.3	51.5	6.3	5.4	76.8	1.1	8.2	2.3	7,730	13,920
	---	41.1	52.5	6.4	5.3	78.3	1.1	6.6	2.3	7,880	14,180
	---	43.9	56.1	---	5.7	83.7	1.2	7.1	2.5	8,420	15,160

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w194969	0.1	B	B	B	9.0	1,160	1,215	1,265
	---	B	B	B				
	---	B	B	B				
w194970	1.7	B	B	B	9.0	1,205	1,270	1,325
	---	B	B	B				
	---	B	B	B				
w194971	.9	B	B	B	9.0	1,175	1,225	1,275
	---	B	B	B				
	---	B	B	B				
w194972	1.3	B	B	B	9.0	1,185	1,235	1,295
	---	B	B	B				
	---	B	B	B				
w194973	1.0	B	B	B	9.0	1,535	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194974	.3	B	B	B	8.5	1,120	1,170	1,215
	---	B	B	B				
	---	B	B	B				
w194975	.8	B	B	B	9.0	1,205	1,270	1,325
	---	B	B	B				
	---	B	B	B				
w194976	1.1	B	B	B	9.0	1,180	1,230	1,290
	---	B	B	B				
	---	B	B	B				
w194977	.4	B	B	B	8.5	1,155	1,215	1,270
	---	B	B	B				
	---	B	B	B				
w194978	2.2	B	B	B	8.5	1,185	1,235	1,295
	---	B	B	B				
	---	B	B	B				
w194979	2.0	B	B	B	8.0	1,235	1,290	1,350
	---	B	B	B				
	---	B	B	B				
w194980	.2	B	B	B	7.5	1,150	1,200	1,265
	---	B	B	B				
	---	B	B	B				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
W194981	2.4	40.2	49.8	7.6	5.4	74.6	1.2	8.2	3.1	7,550	13,590
	---	41.2	51.0	7.8	5.3	76.4	1.2	6.2	3.2	7,740	13,930
	---	44.7	55.3	---	5.7	82.9	1.3	6.7	3.4	8,390	15,100
W194982	2.1	40.7	50.4	6.8	5.3	75.5	1.1	8.2	3.1	7,620	13,710
	---	41.6	51.5	6.9	5.2	77.1	1.1	6.5	3.2	7,780	14,000
	---	44.7	55.3	---	5.6	82.9	1.2	7.0	3.4	8,360	15,050
W194983	3.5	38.1	50.7	7.7	5.4	73.6	1.1	8.8	3.5	7,420	13,360
	---	39.5	52.5	8.0	5.2	76.3	1.1	5.9	3.6	7,690	13,840
	---	42.9	57.1	---	5.6	82.9	1.2	6.4	3.9	8,360	15,040
W194984	2.4	32.1	53.9	11.6	5.0	73.9	1.4	7.1	1.0	7,330	13,190
	---	32.9	55.2	11.9	4.8	75.7	1.4	5.1	1.0	7,510	13,520
	---	37.3	62.7	---	5.5	85.9	1.6	5.8	1.2	8,520	15,340
W194985	3.6	32.5	57.6	6.3	5.3	77.6	1.4	8.7	.7	7,710	13,870
	---	33.7	59.8	6.5	5.1	80.5	1.5	5.7	.7	7,990	14,390
	---	36.1	63.9	---	5.4	86.1	1.6	6.1	.8	8,550	15,390
W194986	2.1	18.4	72.1	7.4	4.7	81.5	1.2	4.1	1.0	7,910	14,240
	---	18.8	73.6	7.6	4.6	83.2	1.2	2.3	1.0	8,080	14,540
	---	20.3	79.7	---	4.9	90.1	1.3	2.5	1.1	8,740	15,730
W194987	2.3	18.9	73.9	4.9	4.7	83.5	1.3	4.4	1.3	8,120	14,620
	---	19.3	75.6	5.0	4.5	85.5	1.3	2.4	1.3	8,310	14,960
	---	20.4	79.6	---	4.8	90.0	1.4	2.5	1.4	8,750	15,750
W194988	4.0	25.5	67.1	3.4	5.2	81.3	1.5	8.1	.6	7,950	14,310
	---	26.6	69.9	3.5	5.0	84.7	1.6	4.7	.6	8,280	14,910
	---	27.5	72.5	---	5.1	87.8	1.6	4.9	.6	8,590	15,460
W194989	2.0	15.7	77.7	4.6	4.6	84.8	1.2	3.8	.9	8,190	14,740
	---	16.0	79.3	4.7	4.5	86.5	1.2	2.1	.9	8,350	15,040
	---	16.8	83.2	---	4.7	90.8	1.3	2.2	1.0	8,770	15,780
W194990	3.7	17.1	75.0	4.2	4.8	82.7	1.6	5.7	1.0	8,040	14,470
	---	17.8	77.9	4.4	4.6	85.9	1.7	2.5	1.0	8,350	15,020
	---	18.6	81.4	---	4.8	89.8	1.7	2.6	1.1	8,730	15,710
W194991	2.8	17.0	72.8	7.4	4.5	80.5	1.2	4.8	1.6	7,800	14,050
	---	17.5	74.9	7.6	4.3	82.8	1.2	2.4	1.6	8,030	14,450
	---	18.9	81.1	---	4.7	89.6	1.3	2.6	1.8	8,690	15,640
W194992	2.1	16.9	66.7	14.3	4.3	74.5	1.1	4.1	1.8	7,210	12,980
	---	17.3	68.1	14.6	4.2	76.1	1.1	2.3	1.8	7,370	13,260
	---	20.2	79.8	---	4.9	89.1	1.3	2.7	2.2	8,630	15,530

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w194981	0.6	B	B	B	7.5	1,125	1,170	1,235
	---	B	B	B				
	---	B	B	B				
w194982	.4	B	B	B	7.5	1,095	1,155	1,220
	---	B	B	B				
	---	B	B	B				
w194983	1.6	B	B	B	8.0	1,090	1,150	1,220
	---	B	B	B				
	---	B	B	B				
w194984	1.2	B	B	B	7.5	1,375	1,435	1,485
	---	B	B	B				
	---	B	B	B				
w194985	2.1	B	B	B	9.0	1,485	1,535	1,540
	---	B	B	B				
	---	B	B	B				
w194986	1.4	B	B	B	9.0	1,455	1,510	1,540
	---	B	B	B				
	---	B	B	B				
w194987	1.5	B	B	B	9.0	1,230	1,285	1,350
	---	B	B	B				
	---	B	B	B				
w194988	2.4	B	B	B	8.0	1,400	1,455	1,520
	---	B	B	B				
	---	B	B	B				
w194989	1.4	B	B	B	8.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194990	2.8	B	B	B	9.0	1,230	1,290	1,355
	---	B	B	B				
	---	B	B	B				
w194991	2.1	B	B	B	7.0	1,345	1,405	1,450
	---	B	B	B				
	---	B	B	B				
w194992	1.6	B	B	B	5.5	1,345	1,405	1,460
	---	B	B	B				
	---	B	B	B				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
W194993	3.1	31.1	52.5	13.3	4.8	71.4	1.3	8.5	0.7	7,000	12,600
	---	32.1	54.2	13.7	4.6	73.7	1.3	5.9	.7	7,220	13,000
	---	37.2	62.8	---	5.3	85.4	1.6	6.9	.8	8,370	15,070
W194994	4.6	28.8	48.9	17.7	4.7	65.9	1.2	9.9	.5	6,490	11,690
	---	30.2	51.3	18.6	4.4	69.1	1.3	6.1	.5	6,810	12,250
	---	37.1	62.9	---	5.4	84.8	1.5	7.5	.6	8,360	15,050
W194995	3.9	24.2	43.7	28.2	4.1	56.6	1.0	9.5	.6	5,530	9,960
	---	25.2	45.5	29.3	3.8	58.9	1.0	6.3	.6	5,760	10,370
	---	35.6	64.4	---	5.4	83.4	1.5	8.9	.9	8,150	14,670
W194996	3.4	28.7	53.5	14.4	4.9	70.0	1.3	8.7	.7	6,830	12,300
	---	29.7	55.4	14.9	4.7	72.5	1.3	5.9	.7	7,070	12,730
	---	34.9	65.1	---	5.5	85.2	1.6	6.9	.9	8,310	14,960
W194997	3.3	20.5	31.5	44.7	3.3	42.7	.8	8.0	.4	4,160	7,480
	---	21.2	32.6	46.2	3.0	44.2	.8	5.2	.4	4,300	7,740
	---	39.4	60.6	---	5.6	82.1	1.5	9.7	.8	8,000	14,390
W194998	3.7	31.5	60.2	4.6	5.3	78.6	1.4	9.4	.6	7,790	14,010
	---	32.7	62.5	4.8	5.1	81.6	1.5	6.3	.6	8,080	14,550
	---	34.4	65.6	---	5.3	85.7	1.5	6.7	.7	8,490	15,280
W194999	2.7	30.7	57.8	8.8	5.1	75.5	1.5	8.2	.9	7,490	13,490
	---	31.6	59.4	9.0	4.9	77.6	1.5	6.0	.9	7,700	13,860
	---	34.7	65.3	---	5.4	85.3	1.7	6.6	1.0	8,470	15,240
W195000	2.0	37.3	54.4	6.3	5.5	77.9	1.5	8.0	.8	7,830	14,100
	---	38.1	55.5	6.4	5.4	79.5	1.5	6.3	.8	7,990	14,390
	---	40.7	59.3	---	5.8	85.0	1.6	6.8	.9	8,540	15,380
W195001	2.7	30.7	56.8	9.8	5.0	75.0	1.4	8.0	.9	7,450	13,410
	---	31.6	58.4	10.1	4.8	77.1	1.4	5.8	.9	7,660	13,780
	---	35.1	64.9	---	5.4	85.7	1.6	6.4	1.0	8,510	15,330
W195002	2.8	33.1	60.8	3.3	5.5	80.3	1.5	8.7	.8	7,960	14,330
	---	34.1	62.6	3.4	5.3	82.6	1.5	6.4	.8	8,190	14,750
	---	35.3	64.7	---	5.5	85.5	1.6	6.6	.9	8,480	15,270
W195003	3.7	27.9	45.6	22.8	4.5	61.6	1.1	8.9	1.1	6,100	10,990
	---	29.0	47.4	23.7	4.2	64.0	1.1	5.8	1.1	6,340	11,410
	---	38.0	62.0	---	5.6	83.8	1.5	7.6	1.5	8,310	14,950
W195004	3.0	32.5	58.4	6.1	5.3	78.1	1.4	8.4	.8	7,750	13,960
	---	33.5	60.2	6.3	5.1	80.5	1.4	5.9	.8	7,990	14,390
	---	35.8	64.2	---	5.5	85.9	1.5	6.3	.9	8,530	15,350

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w194993	1.6	B	B	B	7.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194994	2.6	B	B	B	5.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194995	2.0	B	B	B	3.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194996	1.5	B	B	B	6.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194997	1.5	B	B	B	1.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194998	1.6	B	B	B	8.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w194999	1.2	B	B	B	.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195000	.7	B	B	B	6.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195001	1.2	B	B	B	6.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195002	.9	B	B	B	.50	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195003	2.0	B	B	B	4.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195004	1.4	B	B	B	6.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Moisture	Proximate Analysis: Volatile matter	Fixed carbon	Ash	Ultimate Analysis: Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Heat of Combustion: Kcal/kg	Btu/lb
w195009	3.6	33.8	54.0	8.6	5.3	71.8	1.5	11.2	1.6	7,210	12,970
	---	35.1	56.0	8.9	5.1	74.5	1.6	8.3	1.7	7,480	13,460
	---	38.5	61.5	---	5.6	81.8	1.7	9.1	1.8	8,210	14,770
w195010	4.2	33.3	55.4	7.1	5.2	73.8	1.4	11.7	.7	7,320	13,170
	---	34.8	57.8	7.4	4.9	77.0	1.5	8.3	.7	7,640	13,740
	---	37.5	62.5	---	5.3	83.2	1.6	9.0	.8	8,250	14,840
w195011	4.0	32.3	52.9	10.8	5.0	70.6	1.4	10.9	1.2	6,980	12,560
	---	33.6	55.1	11.2	4.7	73.5	1.5	7.7	1.2	7,270	13,080
	---	37.9	62.1	---	5.3	82.9	1.6	8.6	1.4	8,190	14,740
w195012	4.2	37.2	55.7	2.9	5.6	77.2	1.7	11.3	1.3	7,740	13,940
	---	38.8	58.1	3.0	5.4	80.6	1.8	7.9	1.4	8,080	14,550
	---	40.0	60.0	---	5.5	83.1	1.8	8.1	1.4	8,330	15,000
w195013	3.7	35.8	56.3	4.2	5.5	76.8	1.6	10.4	1.6	7,670	13,800
	---	37.2	58.5	4.4	5.3	79.8	1.7	7.4	1.7	7,960	14,340
	---	38.9	61.1	---	5.5	83.4	1.7	7.7	1.7	8,330	14,990
w195014	4.1	34.8	53.9	7.2	5.3	74.3	1.4	10.8	.9	7,430	13,370
	---	36.3	56.2	7.5	5.1	77.5	1.5	7.5	.9	7,740	13,940
	---	39.2	60.8	---	5.5	83.8	1.6	8.1	1.0	8,370	15,070
w195015	4.5	35.5	55.4	4.6	5.6	74.2	1.6	12.2	1.8	7,470	13,440
	---	37.2	58.0	4.8	5.3	77.7	1.7	8.6	1.9	7,820	14,080
	---	39.1	60.9	---	5.6	81.6	1.8	9.0	2.0	8,220	14,790
w195016	2.9	33.4	42.8	20.9	4.8	63.4	1.1	9.3	.5	6,270	11,290
	---	34.4	44.1	21.5	4.6	65.3	1.1	6.9	.5	6,460	11,630
	---	43.8	56.2	---	5.9	83.2	1.4	8.8	.7	8,230	14,820
w195017	4.3	34.6	51.7	9.4	5.3	70.7	1.4	11.1	2.0	7,120	12,810
	---	36.2	54.0	9.8	5.0	73.9	1.5	7.6	2.1	7,440	13,390
	---	40.1	59.9	---	5.6	81.9	1.6	8.4	2.3	8,250	14,850
w195018	3.8	35.3	47.8	13.1	5.0	69.5	1.4	10.3	.7	6,890	12,410
	---	36.7	49.7	13.6	4.8	72.2	1.5	7.2	.7	7,170	12,900
	---	42.5	57.5	---	5.5	83.6	1.7	8.3	.8	8,300	14,940
w195019	3.1	33.3	58.0	5.6	5.2	77.5	1.5	9.3	.7	7,680	13,830
	---	34.4	59.9	5.8	5.0	80.0	1.5	6.8	.7	7,930	14,270
	---	36.5	63.5	---	5.3	84.9	1.6	7.2	.8	8,410	15,150
w195020	3.1	32.2	61.4	3.3	5.4	80.4	1.4	8.7	.9	7,970	14,340
	---	33.2	63.4	3.4	5.2	83.0	1.4	6.1	.9	8,220	14,800
	---	34.4	65.6	---	5.4	85.9	1.5	6.4	1.0	8,510	15,320

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Air-dried loss	Forms of sulfur: Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C: Initial deform.	soften.	fluid
w195009	0.9	B	B	B	4.0	1,150	1,205	1,270
	---	B	B	B				
	---	B	B	B				
w195010	1.7	B	B	B	4.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195011	1.5	B	B	B	3.5	1,505	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195012	1.3	B	B	B	5.5	1,150	1,210	1,270
	---	B	B	B				
	---	B	B	B				
w195013	1.3	B	B	B	5.0	1,070	1,125	1,180
	---	B	B	B				
	---	B	B	B				
w195014	2.1	B	B	B	5.5	1,350	1,405	1,465
	---	B	B	B				
	---	B	B	B				
w195015	1.9	B	B	B	4.5	1,125	1,175	1,235
	---	B	B	B				
	---	B	B	B				
w195016	1.0	B	B	B	1.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195017	2.4	B	B	B	4.0	1,125	1,185	1,235
	---	B	B	B				
	---	B	B	B				
w195018	1.9	B	B	B	7.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195019	1.3	B	B	B	7.0	1,515	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195020	1.6	B	B	B	8.5	1,070	1,125	1,180
	---	B	B	B				
	---	B	B	B				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Moisture	Proximate Analysis: Volatile matter	Fixed carbon	Ash	Ultimate Analysis: Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Heat of Combustion: Kcal/kg	Btu/lb
w195034	3.9	35.1	55.9	5.1	5.5	76.1	1.5	10.5	1.3	7,590	13,660
	---	36.5	58.2	5.3	5.3	79.2	1.6	7.3	1.4	7,900	14,220
	---	38.6	61.4	---	5.6	83.6	1.6	7.7	1.4	8,340	15,020
w195035	2.8	35.8	49.7	11.7	5.4	71.1	1.5	9.0	1.3	7,140	12,840
	---	36.8	51.1	12.0	5.2	73.1	1.5	6.7	1.3	7,340	13,210
	---	41.9	58.1	---	6.0	83.2	1.8	7.6	1.5	8,350	15,020
w195036	4.6	31.7	62.0	1.7	5.5	80.3	1.4	10.6	.6	7,900	14,220
	---	33.2	65.0	1.8	5.2	84.2	1.5	6.8	.6	8,280	14,900
	---	33.8	66.2	---	5.3	85.7	1.5	6.9	.6	8,430	15,170
w195037	3.9	38.2	54.5	3.4	5.7	77.9	1.6	10.8	.6	7,750	13,950
	---	39.8	56.7	3.5	5.5	81.1	1.7	7.6	.6	8,060	14,520
	---	41.2	58.8	---	5.7	84.0	1.7	7.9	.6	8,360	15,050
w195038	2.3	36.3	57.4	4.0	5.5	80.2	1.5	8.1	.8	7,990	14,380
	---	37.2	58.8	4.1	5.4	82.1	1.5	6.2	.8	8,180	14,720
	---	38.7	61.3	---	5.6	85.6	1.6	6.5	.9	8,530	15,350
w195039	2.8	31.8	58.3	7.1	5.3	77.3	1.4	7.7	1.1	7,700	13,870
	---	32.7	60.0	7.3	5.1	79.5	1.4	5.4	1.1	7,920	14,260
	---	35.3	64.7	---	5.5	85.8	1.6	5.8	1.2	8,550	15,390
w195040	3.4	31.0	50.1	15.5	4.8	68.7	1.2	9.0	.7	6,770	12,180
	---	32.1	51.9	16.0	4.6	71.1	1.2	6.2	.7	7,010	12,610
	---	38.2	61.8	---	5.5	84.7	1.5	7.4	.9	8,350	15,020
w195041	3.5	33.5	53.6	9.4	5.2	74.2	1.4	9.0	.8	7,330	13,190
	---	34.7	55.5	9.7	5.0	76.9	1.5	6.1	.8	7,600	13,670
	---	38.5	61.5	---	5.5	85.2	1.6	6.8	.9	8,420	15,150
w195042	1.6	34.2	53.1	11.1	4.9	74.7	1.3	7.4	.6	7,410	13,330
	---	34.8	54.0	11.3	4.8	75.9	1.3	6.1	.6	7,530	13,550
	---	39.2	60.8	---	5.4	85.6	1.5	6.8	.7	8,490	15,270
w195043	2.0	35.7	56.5	5.8	5.3	79.2	1.6	7.6	.6	7,860	14,150
	---	36.4	57.7	5.9	5.2	80.8	1.6	5.9	.6	8,020	14,430
	---	38.7	61.3	---	5.5	85.9	1.7	6.3	.7	8,520	15,340
w195044	1.6	34.1	51.7	12.6	5.0	72.5	1.4	5.4	3.0	7,340	13,210
	---	34.7	52.5	12.8	4.9	73.7	1.4	4.0	3.0	7,460	13,420
	---	39.7	60.3	---	5.6	84.5	1.6	4.6	3.5	8,550	15,400
w195045	3.7	33.1	53.0	10.2	5.0	72.9	1.4	10.0	.6	7,160	12,890
	---	34.4	55.0	10.6	4.8	75.7	1.5	7.0	.6	7,440	13,380
	---	38.4	61.6	---	5.3	84.7	1.6	7.8	.7	8,320	14,970

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Air-dried loss	Forms of sulfur: Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C: Initial deform.	soften.	fluid
w195034	1.3	B	B	B	6.0	1,180	1,230	1,290
	---	B	B	B				
	---	B	B	B				
w195035	.7	B	B	B	5.0	1,400	1,465	1,515
	---	B	B	B				
	---	B	B	B				
w195036	2.4	B	B	B	6.0	1,295	1,350	1,400
	---	B	B	B				
	---	B	B	B				
w195037	1.6	B	B	B	5.5	1,455	1,515	1,540
	---	B	B	B				
	---	B	B	B				
w195038	.9	B	B	B	7.5	1,515	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195039	1.5	B	B	B	9.0	1,455	1,505	1,505
	---	B	B	B				
	---	B	B	B				
w195040	1.8	B	B	B	4.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195041	1.7	B	B	B	7.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195042	.4	B	B	B	7.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195043	.6	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195044	.6	B	B	B	6.5	1,330	1,395	1,450
	---	B	B	B				
	---	B	B	B				
w195045	1.6	B	B	B	5.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Proximate Analysis: Moisture	Volatile matter	Fixed carbon	Ash	Ultimate Analysis: Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Heat of Combustion: Kcal/kg	Btu/lb
W195046	3.9	34.9	52.4	8.8	5.3	73.6	1.4	9.9	0.9	7,320	13,170
	---	36.3	54.5	9.2	5.1	76.6	1.5	6.7	.9	7,620	13,710
	---	40.0	60.0	---	5.6	84.3	1.6	7.4	1.0	8,380	15,090
W195047	2.3	31.1	61.2	5.4	5.2	80.4	1.4	6.7	.7	7,970	14,350
	---	31.8	62.6	5.5	5.1	82.3	1.4	4.8	.7	8,160	14,680
	---	33.7	66.3	---	5.4	87.1	1.5	5.0	.8	8,630	15,540
W195048	1.8	30.4	63.6	4.2	5.2	82.2	1.4	5.9	1.1	8,160	14,690
	---	31.0	64.8	4.3	5.1	83.7	1.4	4.4	1.1	8,310	14,960
	---	32.3	67.7	---	5.3	87.4	1.5	4.6	1.2	8,680	15,620
W195049	1.8	31.2	56.9	10.1	5.0	75.9	1.4	6.6	1.0	7,580	13,640
	---	31.8	57.9	10.3	4.9	77.3	1.4	5.1	1.0	7,710	13,890
	---	35.4	64.6	---	5.4	86.2	1.6	5.7	1.1	8,600	15,480
W195050	1.0	27.5	54.2	17.3	4.4	70.9	1.2	5.6	.6	7,010	12,630
	---	27.8	54.7	17.5	4.3	71.6	1.2	4.8	.6	7,090	12,750
	---	33.7	66.3	---	5.2	86.8	1.5	5.8	.7	8,590	15,460
W195051	1.6	29.3	60.0	9.1	4.9	77.2	1.3	6.0	1.5	7,650	13,770
	---	29.8	61.0	9.2	4.8	78.5	1.3	4.7	1.5	7,780	14,000
	---	32.8	67.2	---	5.3	86.5	1.5	5.1	1.7	8,570	15,420
W195052	3.7	35.9	52.9	7.5	5.4	74.8	1.5	10.1	.7	7,430	13,370
	---	37.3	54.9	7.8	5.2	77.7	1.6	7.1	.7	7,710	13,880
	---	40.4	59.6	---	5.6	84.2	1.7	7.7	.8	8,360	15,050
W195053	3.3	35.5	43.2	18.0	4.8	62.8	1.2	8.0	5.2	6,440	11,590
	---	36.7	44.7	18.6	4.6	64.9	1.2	5.2	5.4	6,660	11,990
	---	45.1	54.9	---	5.6	79.8	1.5	6.4	6.6	8,180	14,730
W195054	2.6	34.4	58.6	4.4	5.4	79.4	1.5	8.6	.7	7,890	14,210
	---	35.3	60.2	4.5	5.2	81.5	1.5	6.5	.7	8,100	14,590
	---	37.0	63.0	---	5.5	85.4	1.6	6.8	.8	8,490	15,280
W195055	5.1	34.9	57.6	2.4	5.5	78.5	1.5	11.4	.7	7,750	13,950
	---	36.8	60.7	2.5	5.2	82.7	1.6	7.2	.7	8,170	14,700
	---	37.7	62.3	---	5.3	84.9	1.6	7.4	.8	8,380	15,080
W195056	1.8	35.2	53.6	9.4	5.1	75.1	1.3	6.8	2.3	7,520	13,540
	---	35.8	54.6	9.6	5.0	76.5	1.3	5.3	2.3	7,660	13,790
	---	39.6	60.4	---	5.5	84.6	1.5	5.9	2.6	8,470	15,250
W195057	2.1	34.9	54.0	9.0	5.2	75.5	1.4	7.7	1.1	7,510	13,510
	---	35.6	55.2	9.2	5.1	77.1	1.4	6.0	1.1	7,670	13,800
	---	39.3	60.7	---	5.6	84.9	1.6	6.6	1.2	8,440	15,200

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Air-dried loss	Forms of sulfur Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C Initial deform.	soften.	fluid
w195046	1.7	B	B	B	6.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195047	1.4	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195048	.7	B	B	B	9.0	1,120	1,180	1,240
	---	B	B	B				
	---	B	B	B				
w195049	.9	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195050	.3	B	B	B	7.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195051	.6	B	B	B	9.0	1,380	1,435	1,485
	---	B	B	B				
	---	B	B	B				
w195052	1.6	B	B	B	5.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195053	1.3	B	B	B	5.5	1,070	1,125	1,190
	---	B	B	B				
	---	B	B	B				
w195054	.9	B	B	B	9.0	1,455	1,515	1,540
	---	B	B	B				
	---	B	B	B				
w195055	2.5	B	B	B	5.0	1,325	1,395	1,435
	---	B	B	B				
	---	B	B	B				
w195056	.6	B	B	B	8.0	1,200	1,265	1,330
	---	B	B	B				
	---	B	B	B				
w195057	.7	B	B	B	8.5	1,465	1,520	1,540
	---	B	B	B				
	---	B	B	B				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Moisture	Proximate Analysis: Volatile matter	Fixed carbon	Ash	Ultimate Analysis: Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Heat of Combustion: Kcal/kg	Btu/lb
w195058	1.9	35.0	57.6	5.5	5.2	79.9	1.4	7.2	0.7	7,920	14,250
	---	35.7	58.7	5.6	5.1	81.4	1.4	5.6	.7	8,070	14,520
	---	37.8	62.2	---	5.4	86.3	1.5	6.0	.8	8,550	15,390
w195060	2.6	34.0	58.3	5.1	5.3	79.2	1.5	8.0	.9	7,850	14,130
	---	34.9	59.9	5.2	5.1	81.3	1.5	5.8	.9	8,060	14,510
	---	36.8	63.2	---	5.4	85.8	1.6	6.2	1.0	8,510	15,310
w195061	3.2	37.0	52.7	7.1	5.4	76.3	1.4	9.1	.7	7,510	13,520
	---	38.2	54.4	7.3	5.2	78.8	1.4	6.5	.7	7,760	13,970
	---	41.2	58.8	---	5.6	85.1	1.6	7.0	.8	8,380	15,080
w195062	2.4	31.7	52.6	13.3	4.9	71.5	1.4	7.9	.9	7,040	12,680
	---	32.5	53.9	13.6	4.7	73.3	1.4	5.9	.9	7,220	12,990
	---	37.6	62.4	---	5.5	84.8	1.7	6.8	1.1	8,350	15,040
w195063	2.9	34.6	51.4	11.1	4.9	71.2	1.3	9.9	1.6	7,120	12,820
	---	35.6	52.9	11.4	4.7	73.3	1.3	7.5	1.6	7,340	13,210
	---	40.2	59.8	---	5.3	82.8	1.5	8.5	1.9	8,280	14,910
w195064	3.4	29.6	46.1	20.9	4.8	62.6	1.2	9.4	1.2	6,220	11,190
	---	30.6	47.7	21.6	4.6	64.8	1.2	6.6	1.2	6,440	11,590
	---	39.1	60.9	---	5.8	82.7	1.6	8.4	1.6	8,220	14,790
w195066	2.5	33.9	60.2	3.4	5.7	81.3	1.5	7.5	.6	8,060	14,510
	---	34.8	61.7	3.5	5.6	83.4	1.5	5.4	.6	8,270	14,890
	---	36.0	64.0	---	5.8	86.4	1.6	5.6	.6	8,570	15,420
w195067	2.0	34.0	53.7	10.3	5.3	74.2	1.4	7.3	1.5	7,420	13,360
	---	34.7	54.8	10.5	5.2	75.7	1.4	5.6	1.5	7,570	13,630
	---	38.8	61.2	---	5.8	84.6	1.6	6.3	1.7	8,460	15,230
w195068	3.0	32.9	57.1	7.0	5.2	76.3	1.3	8.7	1.6	7,570	13,630
	---	33.9	58.9	7.2	5.0	78.7	1.3	6.2	1.6	7,810	14,060
	---	36.6	63.4	---	5.4	84.8	1.4	6.7	1.8	8,420	15,150
w195005	4.0	30.9	51.9	13.2	4.8	68.8	1.3	10.8	1.1	6,800	12,240
	---	32.2	54.1	13.7	4.5	71.7	1.4	7.5	1.1	7,090	12,750
	---	37.3	62.7	---	5.3	83.1	1.6	8.7	1.3	8,210	14,790
w195006	4.8	31.6	54.2	9.4	5.3	71.5	1.5	11.5	.9	7,070	12,730
	---	33.2	56.9	9.9	5.0	75.1	1.6	7.6	.9	7,430	13,370
	---	36.8	63.2	---	5.6	83.3	1.7	8.4	1.0	8,240	14,830
w195007	8.5	36.9	50.5	4.1	5.7	72.8	1.6	14.8	.9	7,250	13,050
	---	40.3	55.2	4.5	5.2	79.6	1.7	7.9	1.0	7,920	14,260
	---	42.2	57.8	---	5.4	83.3	1.8	8.3	1.0	8,290	14,930

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Air-dried loss	Forms of sulfur Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C Initial deform.	soften.	fluid
w195058	0.4	B	B	B	8.5	1,330	1,395	1,435
	---	B	B	B				
	---	B	B	B				
w195060	1.2	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195061	1.4	B	B	B	7.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195062	.9	B	B	B	7.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195063	.6	B	B	B	7.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195064	1.6	B	B	B	1.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195066	1.1	B	B	B	9.0	1,375	1,430	1,490
	---	B	B	B				
	---	B	B	B				
w195067	.6	B	B	B	9.0	1,350	1,415	1,465
	---	B	B	B				
	---	B	B	B				
w195068	1.2	B	B	B	9.0	1,285	1,345	1,415
	---	B	B	B				
	---	B	B	B				
w195005	1.3	B	B	B	2.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195006	1.9	B	B	B	6.5	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195007	6.0	B	B	B	6.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Proximate Analysis: Moisture	Volatile matter	Fixed carbon	Ash	Ultimate Analysis: Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Heat of Combustion: Kcal/kg	Btu/lb
w195008	3.1	28.2	47.6	21.1	4.5	62.3	1.2	10.1	0.7	6,130	11,040
	---	29.1	49.1	21.8	4.3	64.3	1.2	7.6	.7	6,330	11,390
	---	37.2	62.8	---	5.5	82.2	1.6	9.7	.9	8,090	14,560
w195033	5.2	33.6	54.5	6.7	5.3	73.2	1.4	12.6	.8	7,210	12,980
	---	35.4	57.5	7.1	5.0	77.2	1.5	8.4	.8	7,600	13,690
	---	38.1	61.9	---	5.4	83.1	1.6	9.1	.9	8,180	14,730
w195021	3.2	32.5	60.6	3.7	5.4	79.1	1.6	8.8	1.4	7,890	14,200
	---	33.6	62.6	3.8	5.2	81.7	1.7	6.2	1.4	8,150	14,670
	---	34.9	65.1	---	5.4	85.0	1.7	6.4	1.5	8,480	15,260
w195022	3.1	33.4	53.1	10.4	5.2	73.1	1.4	9.1	.9	7,280	13,100
	---	34.5	54.8	10.7	5.0	75.4	1.4	6.5	.9	7,510	13,520
	---	38.6	61.4	---	5.6	84.5	1.6	7.3	1.0	8,410	15,140
w195023	3.3	33.6	55.4	7.7	5.0	76.4	1.3	9.1	.5	7,520	13,530
	---	34.7	57.3	8.0	4.8	79.0	1.3	6.4	.5	7,770	13,990
	---	37.8	62.2	---	5.2	85.8	1.5	6.9	.6	8,450	15,200
w195024	3.3	30.5	61.9	4.3	5.3	80.4	1.4	7.9	.6	7,930	14,280
	---	31.5	64.0	4.4	5.1	83.1	1.4	5.1	.6	8,200	14,760
	---	33.0	67.0	---	5.3	87.0	1.5	5.4	.6	8,580	15,450
w195025	2.3	32.8	56.8	8.1	5.3	76.5	1.5	7.6	.9	7,610	13,700
	---	33.6	58.1	8.3	5.2	78.3	1.5	5.7	.9	7,790	14,030
	---	36.6	63.4	---	5.6	85.4	1.7	6.2	1.0	8,500	15,300
w195026	2.5	35.4	58.7	3.4	5.5	80.6	1.6	8.0	.9	8,060	14,510
	---	36.3	60.2	3.5	5.4	82.7	1.6	5.9	.9	8,270	14,890
	---	37.6	62.4	---	5.5	85.7	1.7	6.1	1.0	8,570	15,420
w195027	3.1	34.0	56.1	6.8	5.3	76.5	1.5	8.8	1.0	7,620	13,720
	---	35.1	57.9	7.0	5.1	78.9	1.5	6.2	1.0	7,870	14,160
	---	37.7	62.3	---	5.5	84.9	1.7	6.7	1.1	8,460	15,230
w195028	2.9	33.7	58.9	4.5	5.5	79.8	1.6	7.6	.9	8,000	14,400
	---	34.7	60.7	4.6	5.3	82.2	1.6	5.2	.9	8,240	14,830
	---	36.4	63.6	---	5.6	86.2	1.7	5.4	1.0	8,640	15,550
w195029	4.3	29.3	59.9	6.0	5.0	75.1	1.4	12.0	.6	7,280	13,100
	---	30.8	62.9	6.3	4.7	78.9	1.5	8.1	.6	7,650	13,760
	---	32.8	67.2	---	5.0	84.2	1.6	8.7	.7	8,160	14,690
w195030	4.2	36.7	52.0	7.1	5.4	74.3	1.5	11.0	.7	7,410	13,340
	---	38.3	54.3	7.4	5.1	77.6	1.6	7.6	.7	7,730	13,920
	---	41.4	58.6	---	5.6	83.8	1.7	8.2	.8	8,350	15,040

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Air-dried loss	Forms of sulfur Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C Initial deform.	soften.	fluid
w195008	1.1	B	B	B	1.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195033	1.8	B	B	B	3.0	1,470	1,530	1,540
	---	B	B	B				
	---	B	B	B				
w195021	1.5	B	B	B	9.0	1,125	1,175	1,240
	---	B	B	B				
	---	B	B	B				
w195022	1.5	B	B	B	8.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195023	1.9	B	B	B	5.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195024	1.9	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195025	.8	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195026	1.0	B	B	B	9.0	1,235	1,290	1,350
	---	B	B	B				
	---	B	B	B				
w195027	1.5	B	B	B	9.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195028	1.2	B	B	B	8.5	1,265	1,325	1,380
	---	B	B	B				
	---	B	B	B				
w195029	1.7	B	B	B	1.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195030	1.4	B	B	B	5.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
W195031	4.3	37.0	53.6	5.1	5.3	75.9	1.4	11.6	0.6	7,550	13,580
	---	38.7	56.0	5.3	5.0	79.3	1.5	8.1	.6	7,890	14,190
	---	40.8	59.2	---	5.3	83.8	1.5	8.6	.7	8,330	14,990
W195032	3.7	35.1	50.9	10.3	5.2	71.5	1.4	11.0	.7	7,080	12,750
	---	36.4	52.9	10.7	5.0	74.2	1.5	8.0	.7	7,360	13,240
	---	40.8	59.2	---	5.6	83.1	1.6	9.0	.8	8,240	14,830

Table 8e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 230 bituminous coal samples from West Virginia--continued

Sample number	Air-dried loss	Forms of sulfur: Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C: Initial deform.	soften.	fluid
w195031	1.5	B	B	B	5.0	1,540	1,540	1,540
	---	B	B	B				
	---	B	B	B				
w195032	1.1	B	B	B	3.5	1,540	1,540	1,540
	---	B	B	B				

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia.

[Values in percent or parts-per-million. Coal ashed at 525 C. L means less than the value shown; N, not detected; B, not determined; S after element title indicates determinations by automatic plate reading computer assisted, emission spectographic analyses. The standard deviation of any single answer should be taken as plus 50% and minus 35%. Methods of analyses for other elements as shown in figure 1.]

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w193726	39.1	57	26	0.30	1.6	0.08	4.0	3.9	1.2	0.08	w193726
w193727	11.7	47	28	1.2	1.3	.28	.86	9.1	1.3	.04	w193727
w193728	3.6	56	25	.48	1.3	.35	3.3	4.7	1.1	.05	w193728
w193729	3.8	40	28	1.4	.98	.32	.41	19	.68	.04	w193729
w193941	6.9	47	28	2.6	.28	.53	1.3	7.6	1.9	2.7	w193941
w193942	9.4	39	20	.71	.50	.43	1.5	27	.92	.18	w193942
w193943	9.2	42	24	.61	.14	.23	.82	20	1.8	.30	w193943
w193944	2.7	51	18	11	.35	1.6	.59	13	2.8	.33	w193944
w193951	5.1	54	23	1.2	.50	.41	1.1	9.3	1.8	.34	w193951
w193952	6.8	48	29	2.0	1.2	.32	3.1	4.1	.86	.11	w193952
w193953	3.8	46	25	1.9	1.3	.74	2.4	9.2	.88	.19	w193953
w193954	4.6	63	24	.83	.33	.97	.59	1.9	2.3	.02	w193954
w193955	14.8	58	29	1.1	.75	.19	2.0	3.0	1.9	.05	w193955
w193956	22.4	59	28	.66	.83	.22	2.9	1.9	1.5	.01	w193956
w193957	18.1	56	29	.51	1.3	.37	3.9	3.4	1.4	.05	w193957
w193958	7.0	35	19	7.8	2.0	1.3	2.1	14	1.1	B	w193958
w193959	9.3	43	27	.72	1.0	.40	4.6	19	.82	.04	w193959
w193960	5.4	34	22	11	2.0	1.8	1.1	11	1.2	.03	w193960
w193961	6.3	53	28	1.2	.86	.49	1.1	8.4	1.7	.03	w193961
w193962	6.0	46	33	1.1	1.2	.50	2.0	6.7	1.5	.05	w193962
w193963	5.0	50	32	1.3	.85	.56	1.4	5.6	1.5	.03	w193963
w193964	7.6	48	28	1.0	.99	.37	2.0	12	1.2	.04	w193964
w193965	4.2	38	25	1.9	1.4	.48	.53	22	1.0	.02	w193965
w193966	12.5	53	27	.50	.83	.35	3.0	6.3	1.3	.04	w193966
w193967	8.2	46	29	.66	1.1	.64	3.5	10	1.1	.04	w193967
w193968	4.0	45	30	1.1	.70	1.3	2.0	7.6	1.8	.22	w193968
w193969	11.9	52	27	.70	1.3	.94	3.4	6.0	1.3	.06	w193969
w193970	8.1	60	21	.73	.66	.77	.58	5.9	2.3	.14	w193970
w193971	4.1	44	26	1.2	1.6	1.0	1.6	12	1.4	.09	w193971
w193972	7.6	59	23	.78	.61	.94	.45	4.0	2.5	.17	w193972
w193973	6.8	51	20	6.8	1.3	.79	.69	7.2	2.2	.04	w193973
w193974	5.8	37	18	1.4	1.0	.50	1.6	23	.79	.09	w193974
w193975	7.3	56	25	.84	.75	.64	.19	5.8	3.0	.14	w193975
w193976	5.1	34	21	14	1.6	1.3	.27	8.6	1.6	.19	w193976
w193977	2.2	49	29	2.1	.70	1.5	1.1	5.0	1.5	.21	w193977
w193978	1.7	45	28	1.9	.91	2.3	1.2	7.4	1.3	.20	w193978
w193979	2.1	47	30	2.4	.75	1.6	1.2	4.1	1.2	.23	w193979
w193980	9.1	48	25	.79	1.5	.58	3.9	9.7	.89	.13	w193980
w193981	2.6	40	30	2.3	1.0	1.1	.61	8.7	1.4	.05	w193981
w193982	6.8	53	25	3.1	.73	1.0	.32	4.7	2.0	.04	w193982

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	SO3 (percent)	Ag-S (ppm)	Au-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Bi-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Sample number
w193726	0.10	0.60	10L	110	520	13	22L	1.3	61	16	w193726
w193727	1.6	.40	10L	96	450	13	22L	.62	77	92	w193727
w193728	.60	.60	10L	100	650	20	22L	1.1	390	410	w193728
w193729	2.4	1.2	10L	31	870	66	22L	.72	1,400	350	w193729
w193941	1.1	1.0	10L	100	1,300	33	22L	2.3	360	70	w193941
w193942	1.0	.60	10L	64	270	29	22L	1.2	430	71	w193942
w193943	.72	.90	10L	41	490	26	22L	1.0	220	61	w193943
w193944	.07	.50	10L	200	430	20	22L	.16	410	96	w193944
w193951	1.8	.30	10L	110	1,100	53	22L	.64	180	100	w193951
w193952	2.5	6.0	10L	440	640	56	22L	.90	160	320	w193952
w193953	5.2	2.3	10L	140	5,400	150	22L	2.0	260	310	w193953
w193954	1.1	.90	10L	100	1,000	100	22L	.52	200	150	w193954
w193955	1.4	.20	10L	180	290	11	22L	.20	180	24	w193955
w193956	.50	.10	10L	170	440	8.0	22L	.10L	160	40	w193956
w193957	.75	.10	10L	83	1,000	11	22L	.39	160	41	w193957
w193958	5.3	.30	10L	140	1,000	13	22L	.56	210	120	w193958
w193959	1.2	.80	10L	89	490	25	22L	.92	200	44	w193959
w193960	5.1	.20	10	170	1,300	11	22L	.48	260	160	w193960
w193961	1.5	.70	10L	89	630	28	22L	1.1	300	97	w193961
w193962	1.6	.60	10L	110	790	13	22L	1.2	230	35	w193962
w193963	1.5	.70	10L	94	810	44	22L	1.2	340	210	w193963
w193964	1.4	.80	10L	69	850	23	22L	1.4	260	70	w193964
w193965	2.9	.50	10L	64	1,200	22	22L	.94	310	160	w193965
w193966	.82	.40	10L	74	530	19	22L	1.5	240	35	w193966
w193967	1.2	.50	10L	100	460	24	22L	.74	180	73	w193967
w193968	1.6	1.5	10L	130	870	33	22L	1.3	270	170	w193968
w193969	1.0	.50	10L	110	580	17	22L	.92	160	60	w193969
w193970	1.0	.20	10L	130	590	25	22L	.42	260	85	w193970
w193971	2.2	.50	10L	160	940	22	22L	.74	220	98	w193971
w193972	.90	.30	10L	140	880	44	22L	.38	300	140	w193972
w193973	2.5	.30	10L	110	850	35	22L	.41	220	150	w193973
w193974	2.5	.80	10L	21	430	33	22L	.96	240	200	w193974
w193975	.90	.50	10L	120	490	26	22L	.64	340	110	w193975
w193976	5.2	.30	10L	110	850	12	22L	.58	270	180	w193976
w193977	2.9	1.6	10L	160	540	100	22L	1.7	410	430	w193977
w193978	2.8	2.2	10L	150	440	150	22L	2.8	470	460	w193978
w193979	3.3	.80	10L	150	530	50	22L	1.4	430	540	w193979
w193980	1.5	.40	10L	76	1,400	22	22L	1.4	210	130	w193980
w193981	3.0	2.1	10L	87	1,500	43	22L	.58	350	310	w193981
w193982	2.3	.40	10L	120	390	25	22L	.36	320	65	w193982

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Cr (ppm)	Cs (ppm)	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Sample number
w193726	31	2.0	120	32L	10L	1.0	35	7.0L	7.0	1.8	w193726
w193727	36	.9	120	32L	12	1.5	33	8.0	8.0	2.6	w193727
w193728	180	8.3L	200	32L	10L	7.5	36	16	5.0L	8.3	w193728
w193729	1,400	130	230	36	22	24	31	36	33	63	w193729
w193941	190	4.3	440	32L	22	7.4	54	39	11	10	w193941
w193942	140	6.4	240	36	24	9.0	59	35	7.0	7.4	w193942
w193943	130	2.2	300	32L	14	5.0	48	14	16	11	w193943
w193944	120	19L	360	32L	12	5.2	47	10	5.0	11	w193944
w193951	210	3.9	350	32L	11	3.9	130	14	100	9.8	w193951
w193952	140	8.8	260	32L	14	4.7	120	24	22	4.4	w193952
w193953	160	34	1,000	32L	18	8.4	210	49	140	5.3	w193953
w193954	150	2.2	360	32L	10L	3.9	78	14	40	11	w193954
w193955	160	9.5	140	32L	10L	2.8	42	7.0L	5.0L	8.8	w193955
w193956	130	13	60	32L	10L	2.7	44	7.0L	5.0L	7.1	w193956
w193957	130	17	100	32L	10L	2.7	35	7.0L	5.0L	6.6	w193957
w193958	130	13	190	32L	10L	3.6	34	12	5.0L	7.1	w193958
w193959	120	24	200	32L	10L	3.1	47	15	5.0L	4.3	w193959
w193960	120	7.4	230	32L	10L	3.9	31	15	5.0L	7.4	w193960
w193961	170	6.3	250	32L	11	4.9	42	14	5.0L	13	w193961
w193962	150	10	240	32L	10L	4.2	49	14	5.0L	10	w193962
w193963	200	6.0	270	32L	10	5.8	54	13	6.0	12	w193963
w193964	150	13	300	32L	10L	5.0	43	13	6.0	6.6	w193964
w193965	180	4.8	210	32L	13	6.0	47	18	6.0	9.5	w193965
w193966	150	19	290	32L	10L	4.1	41	7.0L	5.0L	7.2	w193966
w193967	180	21	190	32L	10L	3.5	53	7.0L	48	4.9	w193967
w193968	230	7.5	440	32L	14	5.5	84	20	29	10	w193968
w193969	140	13	220	32L	10L	2.9	42	8.0	9.0	6.7	w193969
w193970	170	2.5	190	32L	10L	3.5	34	7.0L	7.0	12	w193970
w193971	130	7.3	180	32L	10L	3.4	47	12	5.0L	9.8	w193971
w193972	200	1.3	240	32L	11	4.1	51	11	15	14	w193972
w193973	120	1.5	170	32L	12	3.4	50	23	14	10	w193973
w193974	140	6.9	230	32L	14	10	62	32	18	6.9	w193974
w193975	210	11L	240	32L	10L	4.9	51	17	10	16	w193975
w193976	120	18L	250	32L	12	4.1	39	12	5.0	9.8	w193976
w193977	200	4.5	600	32L	15	9.5	91	27	87	9.1	w193977
w193978	310	5.9	780	32L	11	12	140	11	170	12	w193978
w193979	200	4.8	330	32L	18	11	100	29	24	9.5	w193979
w193980	130	12	290	32L	10L	3.7	61	8.0	7.0	4.4	w193980
w193981	210	23L	670	32L	13	8.5	69	12	12	7.7	w193981
w193982	180	2.9	200	32L	11	4.9	43	15	10	13	w193982

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Ho-S (ppm)	In-S (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Sample number
w193726	7.0L	7.0L	31	150	0.3	170	2.0L	21	70	84	w193726
w193727	7.0L	7.0L	43	130	.9	130	6.0	18	93	85	w193727
w193728	7.0L	7.0L	250	160	3	100	27	23	110	350	w193728
w193729	7.0L	7.0L	740	130	10	160	94	24	210	310	w193729
w193941	10L	7.0L	200	120	3	330	32	28	230	140	w193941
w193942	7.0L	7.0L	200	120	3	160	42	8	240	160	w193942
w193943	7.0L	7.0L	98	230	2	100	38	18	86	140	w193943
w193944	7.0L	7.0L	330	100	4L	210	76	18	170	370	w193944
w193951	7.0L	7.0L	120	130	2	81	17	17	51	220	w193951
w193952	7.0L	7.0L	74	100	3	110	13	7	84	320	w193952
w193953	10L	7.0L	110	100	5	320	17	19	140	320	w193953
w193954	7.0L	7.0L	110	130	2	31	5.0	40	110	260	w193954
w193955	7.0L	7.0L	95	160	1	110	5.0	11	46L	58	w193955
w193956	7.0L	7.0L	85	93	.9	83	2.0L	28	46L	52	w193956
w193957	7.0L	7.0L	83	140	1	110	3.0	10	46L	50	w193957
w193958	7.0L	7.0L	130	130	1	430	11	9	46L	85	w193958
w193959	7.0	7.0L	130	150	1	71	36	10	69	69	w193959
w193960	7.0L	7.0L	150	170	2	560	11	13	71	110	w193960
w193961	7.0L	7.0L	170	180	2	57	25	37	98	150	w193961
w193962	7.0L	7.0L	130	150	2	71	25	21	110	150	w193962
w193963	7.0L	7.0L	180	230	2	50	29	23	77	190	w193963
w193964	7.0L	7.0L	140	180	3	290	23	13	80	96	w193964
w193965	10L	7.0L	170	210	2	480	30	14	97	190	w193965
w193966	7.0L	7.0L	130	160	2	190	12	11	69	55	w193966
w193967	7.0L	7.0L	98	210	1	130	13	10	46L	100	w193967
w193968	7.0L	7.0L	150	250	3	58	32	25	160	280	w193968
w193969	7.0L	7.0L	84	170	.8	120	16	14	60	84	w193969
w193970	7.0L	7.0L	150	240	1	110	12	32	57	130	w193970
w193971	7.0L	7.0L	150	180	2	210	26	19	83	220	w193971
w193972	7.0L	7.0L	200	250	1	110	6.0	42	83	180	w193972
w193973	100L	7.0L	130	150	1	390	23	42	61	180	w193973
w193974	7.0L	7.0L	100	120	3	280	23	13	130	200	w193974
w193975	7.0L	7.0L	210	280	1	100	21	44	130	130	w193975
w193976	7.0L	7.0L	160	210	2	480	11	16	46L	75	w193976
w193977	7.0L	7.0L	230	150	5	65	30	21	100	520	w193977
w193978	7.0L	7.0L	240	150	6	93	28	10	110	460	w193978
w193979	7.0	7.0L	240	160	5	62	22	12	150	600	w193979
w193980	7.0L	7.0L	110	140	1	170	29	5	88	200	w193980
w193981	7.0L	7.0L	190	260	4	190	35	12	110	260	w193981
w193982	7.0L	7.0L	190	200	1	160	10	31	49	120	w193982

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Re-S (ppm)	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Sample number
w193726	110	100L	36	10L	6.6	5.6	7.0L	150	0.77	23	w193726
w193727	70	68L	110L	10L	8.5	7.7	7.0L	320	.85	26L	w193727
w193728	71	68L	360L	10L	33	39	12	890	5.6	83L	w193728
w193729	160	68L	2,100	10L	320	140	7.0L	1,300	21	79L	w193729
w193941	100	68L	250L	10L	43	38	7.0L	2,600	5.8	43L	w193941
w193942	50	100L	220L	10L	38	45	7.0L	350	7.4	32L	w193942
w193943	58	68L	160L	10L	33	23	7.0L	370	3.3	33L	w193943
w193944	93	68L	630L	10L	30	30	7.0L	1,100	3.7	110L	w193944
w193951	89	68L	220L	10L	55	18	7.0L	1,000	3.9	140	w193951
w193952	120	68L	160L	10L	37	22	7.0L	600	4.4	44L	w193952
w193953	160	68	260L	10L	82	34	7.0L	950	7.9	79L	w193953
w193954	98	68L	240L	10L	35	20	7.0L	730	4.3	65L	w193954
w193955	79	68L	34	10L	32	14	7.0L	250	2.0	20L	w193955
w193956	44	68L	45	10L	26	13	7.0L	210	1.8	13L	w193956
w193957	46	68L	50	10L	29	13	7.0L	230	1.7	140	w193957
w193958	65	68L	1,000L	10L	26	17	8.0	750	2.9	43L	w193958
w193959	66	68L	530L	10L	25	17	7.0L	300	2.2	32L	w193959
w193960	63	68L	940L	10L	28	20	9.0	990	3.7	56L	w193960
w193961	89	68L	590L	10L	37	25	7.0L	860	4.8	48L	w193961
w193962	94	68L	580L	10L	32	22	7.0L	950	3.3	50L	w193962
w193963	91	68L	740L	10L	42	28	16	1,000	4.0	60L	w193963
w193964	85	68L	530L	10L	36	26	7.0L	620	3.9	39L	w193964
w193965	90	68L	760L	10L	38	29	10	1,000	4.8	71L	w193965
w193966	78	68L	350L	10L	36	22	9.0	260	3.2	24L	w193966
w193967	58	68L	560L	10L	33	18	7.0L	310	2.4	73	w193967
w193968	110	68L	1,100L	10L	53	28	7.0L	980	5.0	75L	w193968
w193969	60	68L	450L	10L	29	14	7.0L	270	2.5	25L	w193969
w193970	70	68L	480L	10L	33	20	12	510	3.7	37L	w193970
w193971	61	68L	760L	10L	32	17	7.0L	840	2.4	73L	w193971
w193972	92	68L	570L	10L	38	22	7.0L	690	3.9	39L	w193972
w193973	100	68L	570L	10L	32	18	12	980	4.4	44L	w193973
w193974	63	68L	620L	10L	36	53	10	540	6.9	52L	w193974
w193975	110	68L	520L	10L	47	26	16	720	4.1	41L	w193975
w193976	79	68L	820L	10L	33	22	13	910	3.9	59L	w193976
w193977	120	68L	1,500L	46L	59	50	7.0L	1,500	9.1	140L	w193977
w193978	140	68L	1,900L	10L	82	59	12	1,400	12	180L	w193978
w193979	77	68L	1,400L	10L	57	57	17	1,700	9.5	140L	w193979
w193980	72	68L	B	10L	30	20	7.0L	510	2.2	33L	w193980
w193981	150	68L	B	10L	65	38	10	2,700	7.7	120L	w193981
w193982	89	68L	B	10L	41	24	12	650	4.4	44L	w193982

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Tl-S (ppm)	Tm (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w193726	10L	5.0L	7.7	150	51	2.0	420	160	w193726
w193727	10L	5.0L	8.5	140	79	2.6	120	180	w193727
w193728	10L	5.0L	11	150	75	11	88	160	w193728
w193729	10L	5.0L	7.9	200	160	63	86	310	w193729
w193941	10L	5.0L	36	270	230	16	180	340	w193941
w193942	10L	5.0L	34	230	180	21	250	110	w193942
w193943	10L	5.0L	13	190	67	11	34	240	w193943
w193944	10L	5.0L	11	140	73	7.4	53	140	w193944
w193951	10L	5.0L	37	190	110	14	69	150	w193951
w193952	10L	5.0L	21	200	200	15	240	93	w193952
w193953	10L	5.0L	58	330	510	37	880	160	w193953
w193954	10L	5.0L	37	130	190	13	61	390	w193954
w193955	10L	5.0L	15	160	24	6.1	58	97	w193955
w193956	10L	5.0L	8.5	150	24	5.4	39	250	w193956
w193957	10L	5.0L	9.9	150	40	6.6	120	120	w193957
w193958	16	5.0L	26	75	52	7.1	120	110	w193958
w193959	26	5.0L	28	130	68	6.5	120	86	w193959
w193960	10L	5.0L	24	70	66	7.4	110	140	w193960
w193961	11	5.0L	30	160	84	9.5	140	210	w193961
w193962	10L	5.0L	30	180	67	8.3	99	150	w193962
w193963	10L	5.0L	26	180	57	12	360	140	w193963
w193964	11	5.0L	25	170	58	12	160	110	w193964
w193965	10L	5.0L	31	140	100	17	57	130	w193965
w193966	10L	5.0L	18	150	47	9.6	190	96	w193966
w193967	26	5.0L	17	170	26	8.5	100	76	w193967
w193968	10L	5.0L	45	290	110	13	45	210	w193968
w193969	11	5.0L	18	190	42	6.7	86	100	w193969
w193970	10L	5.0L	19	130	47	8.6	65	220	w193970
w193971	10L	5.0L	22	130	51	7.3	120	140	w193971
w193972	10L	5.0L	20	150	54	9.2	52	320	w193972
w193973	10L	5.0L	21	150	92	8.8	62	420	w193973
w193974	42	5.0L	33	130	110	17	160	120	w193974
w193975	10L	5.0L	25	180	81	11	42	300	w193975
w193976	10L	5.0L	27	72	54	7.8	33	200	w193976
w193977	10L	5.0	45	240	110	23	280	110	w193977
w193978	10L	5.0L	71	230	110	24	530	87	w193978
w193979	10L	5.0L	38	220	190	24	210	120	w193979
w193980	20	5.0L	35	190	51	7.7	260	78	w193980
w193981	10L	5.0L	42	240	110	19	120	88	w193981
w193982	10L	5.0L	25	120	82	10	33	220	w193982

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w193983	4.6	38	22	9.0	2.3	1.7	0.43	9.7	1.4	0.02	w193983
w193984	5.2	44	31	1.5	1.3	1.2	.75	9.4	1.7	.04	w193984
w193985	5.0	40	32	2.1	1.6	1.4	.53	11	1.5	.09	w193985
w193986	5.4	46	30	1.5	1.2	.66	.74	9.7	1.6	.05	w193986
w193987	6.2	57	24	1.4	.85	.88	.49	8.1	2.1	.09	w193987
w193988	9.1	58	25	.70	.63	1.2	.75	4.3	2.1	.15	w193988
w193991	3.0	37	24	1.4	.90	1.2	2.2	17	1.0	.06	w193991
w193992	2.9	43	27	1.5	1.0	1.9	2.4	11	1.1	.09	w193992
w193993	9.3	42	25	.64	1.4	.62	3.8	17	.92	.02	w193993
w193994	5.5	42	31	1.5	1.3	.71	2.5	13	.86	.06	w193994
w193995	10.6	51	25	.48	1.6	.48	4.4	8.5	.97	.09	w193995
w193996	12.9	49	29	.51	1.3	.44	4.1	7.0	1.1	.19	w193996
w193997	10.2	44	28	.56	1.1	.43	3.3	13	.92	.11	w193997
w193998	19.7	53	27	.52	1.6	.56	4.9	4.9	1.2	.02	w193998
w193999	3.8	38	31	1.4	1.1	.70	1.9	17	.79	.04	w193999
w194000	28.3	52	25	.40	1.8	.34	4.5	3.8	1.1	B	w194000
w194001	9.5	51	24	1.6	1.0	.56	1.6	11	1.2	.39	w194001
w194002	6.3	46	29	.83	1.4	1.3	3.6	8.8	1.4	.17	w194002
w194003	9.6	46	27	.95	1.2	1.0	3.8	9.4	1.5	.44	w194003
w194004	3.4	41	31	1.6	1.4	1.2	2.1	10	1.0	.10	w194004
w194005	3.1	49	28	.62	1.3	1.5	3.5	9.9	.77	.03	w194005
w194006	3.1	40	32	1.6	1.3	1.0	.88	11	.91	.10	w194006
w194007	3.3	42	32	1.4	.96	1.0	1.8	12	.74	.41	w194007
w194008	2.2	36	29	1.7	1.1	2.0	.96	15	.70	.20	w194008
w194009	2.7	43	32	1.6	.78	1.6	1.5	7.1	.97	.64	w194009
w194010	9.0	55	26	.73	1.2	.59	1.9	4.9	1.4	.05	w194010
w194011	5.4	37	21	12	1.6	1.6	.33	7.2	1.6	.04	w194011
w194012	35.8	56	27	.40	1.5	.32	4.8	3.7	1.1	.06	w194012
w194013	44.9	57	26	.34	1.7	.34	5.1	3.6	1.0	.05	w194013
w194014	17.6	51	29	.53	1.2	.28	4.2	4.0	1.1	.17	w194014
w194015	14.0	53	26	.63	1.6	.54	4.3	7.6	1.0	.10	w194015
w194016	6.4	53	28	.69	.86	.35	1.4	6.3	1.3	.06	w194016
w194017	7.6	54	32	.61	.86	.26	1.6	4.7	1.1	.05	w194017
w194018	5.3	54	26	.93	.93	.58	1.3	8.1	1.6	.04	w194018
w194019	7.9	49	26	.94	1.3	.62	3.0	7.0	1.1	.17	w194019
w194020	9.5	53	24	.92	1.1	.46	3.0	9.7	1.1	.16	w194020
w194021	6.1	48	30	.84	.91	1.6	2.5	5.4	1.1	.08	w194021
w194880	40.1	58	24	.31	1.5	.17	4.3	3.5	1.4	.01	w194880
w199324	2.3	36	31	4.9	1.0	2.3	1.4	14	.66	.14	w199324
w199325	2.5	44	35	3.7	.68	1.1	.41	3.8	1.2	.18	w199325

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	SO3 (percent)	Ag-S (ppm)	Au-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Bi-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Sample number
w193983	6.6	0.50	10L	150	1,300	25	22L	0.64	260	210	w193983
w193984	2.2	.70	10L	140	880	32	22L	.82	330	170	w193984
w193985	2.9	.80	10L	150	990	23	22L	.94	300	56	w193985
w193986	1.8	.90	10L	89	940	36	22L	.50	280	310	w193986
w193987	2.4	.50	10L	120	970	28	22L	.80	290	98	w193987
w193988	.78	.40	10L	170	530	47	22L	1.0	260	74	w193988
w193991	3.7	1.5	10L	150	5,100	52	22L	1.9	200	250	w193991
w193992	2.5	.80	10L	250	1,600	38	22L	1.1	240	130	w193992
w193993	1.9	.30	10L	66	1,100	60	22L	1.0	150	110	w193993
w193994	2.7	.40	10L	110	530	26	22L	1.1	160	130	w193994
w193995	1.0	.40	10L	110	490	11	22L	.50	210	88	w193995
w193996	.72	.30	10L	110	440	12	22L	.60	160	79	w193996
w193997	.89	.30	10L	97	410	13	22L	.70	200	96	w193997
w193998	.91	.30	10L	110	990	13	22L	.34	160	27	w193998
w193999	2.6	.80	10L	71	930	19	22L	1.1	210	89	w193999
w194000	.50	.20	10L	100	600	7.0	22L	.35	120	23	w194000
w194001	1.7	.40	10L	56	660	21	22L	.40	200	110	w194001
w194002	1.2	.70	10L	110	850	13	22L	.62	220	68	w194002
w194003	1.1	.70	10L	120	990	15	22L	.70	230	58	w194003
w194004	2.2	1.5	10L	92	1,500	48	22L	1.4	240	200	w194004
w194005	1.3	1.5	10L	100	1,200	38	22L	1.2	230	68	w194005
w194006	2.5	1.0	10L	81	1,100	48	22L	1.1	290	320	w194006
w194007	2.8	1.0	10L	110	2,700	29	22L	1.9	300	88	w194007
w194008	3.1	1.2	10L	140	850	25	22L	1.7	320	130	w194008
w194009	2.3	.70	10L	170	2,400	36	22L	.88	410	130	w194009
w194010	.79	.50	10L	110	740	26	22L	.64	230	82	w194010
w194011	4.2	.40	10L	170	940	32	22L	.70	240	150	w194011
w194012	.77	.20	10L	95	680	9.0	22L	.27	130	18	w194012
w194013	.50	.10	10L	86	540	7.0	22L	.22	120	13	w194013
w194014	.77	.30	10L	79	640	10	22L	.56	180	45	w194014
w194015	1.3	.40	10L	100	1,100	17	22L	1.1	170	82	w194015
w194016	.73	.70	10L	61	350	35	22L	.90	220	180	w194016
w194017	.57	.60	10L	53	350	30	22L	.85	240	93	w194017
w194018	1.1	1.0	10L	87	610	44	22L	.74	170	280	w194018
w194019	1.1	.80	10L	98	690	35	22L	1.8	250	110	w194019
w194020	1.4	.50	10L	75	600	31	22L	1.4	190	100	w194020
w194021	1.1	.50	10L	90	390	25	22L	.62	360	43	w194021
w194880	.43	.10L	10L	99	380	7.0	15L	.18	130	11	w194880
w199324	7.8	1.0	10L	1,000	1,500	83	15L	2.2	300	240	w199324
w199325	5.4	1.0	10L	1,000	1,100	150	15L	1.8	320	460	w199325

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Cr (ppm)	Cs (ppm)	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Sample number
w193983	160	4.3	240	32L	10L	4.1	66	11	16	11	w193983
w193984	200	3.8	290	32L	10L	4.8	53	11	7.0	13	w193984
w193985	150	2.0	270	32L	10	4.4	42	28	5.0L	10	w193985
w193986	190	3.7	300	32L	10L	4.4	68	10	12	9.3	w193986
w193987	160	3.2	210	32L	10L	5.0	35	9.0	5.0L	11	w193987
w193988	200	2.2	210	32L	10L	4.1	35	8.0	5.0	12	w193988
w193991	150	10	360	32L	10L	5.7	97	14	79	6.7	w193991
w193992	150	14	310	32L	11	5.9	78	14	53	6.9	w193992
w193993	140	22	300	32L	10L	3.7	62	7.0L	48	4.3	w193993
w193994	130	11	190	32L	10L	3.3	38	9.0	22	3.6	w193994
w193995	170	17	160	32L	10L	3.7	44	7.0L	9.0	4.7	w193995
w193996	140	12	200	32L	10L	2.5	45	7.0L	6.0	4.7	w193996
w193997	150	17	180	32L	10L	3.8	46	7.0L	5.0L	4.9	w193997
w193998	140	23	120	32L	10L	2.4	54	7.0	5.0L	5.1	w193998
w193999	140	13	270	32L	10L	4.7	57	7.0	19	5.3	w193999
w194000	110	16	120	32L	10L	2.2	56	9.0	5.0L	3.9	w194000
w194001	130	13	130	32L	13	3.5	48	21	14	7.4	w194001
w194002	160	17	210	32L	10L	4.0	66	12	5.0L	7.9	w194002
w194003	160	17	210	32L	10L	3.6	62	11	5.0L	8.3	w194003
w194004	160	12	450	32L	10L	5.3	63	16	16	5.9	w194004
w194005	120	19	350	32L	10L	5.2	74	16	8.0	6.5	w194005
w194006	160	3.2	520	68	10L	6.8	42	16	14	6.5	w194006
w194007	120	9.1	420	32L	10L	7.0	56	25	6.0	3.0	w194007
w194008	140	9.1	470	32L	10L	8.6	46	29	7.0	4.5	w194008
w194009	150	7.4	340	32L	12	10	52	24	6.0	3.7	w194009
w194010	130	16	210	32L	10L	3.6	37	8.0	5.0	7.8	w194010
w194011	110	15L	230	32L	10L	3.7	46	19	27	11	w194011
w194012	110	18	100	32L	10L	1.9	43	7.0L	5.0L	5.0	w194012
w194013	100	18	85	32L	10L	1.8	39	7.0L	5.0L	4.5	w194013
w194014	120	20	170	32L	10L	2.6	50	7.0L	5.0L	6.3	w194014
w194015	120	14	220	32L	10L	3.0	49	11	6.0	4.3	w194015
w194016	150	4.7	250	32L	11	4.1	50	11	14	7.8	w194016
w194017	120	5.3	170	32L	13	4.3	48	13	14	6.6	w194017
w194018	130	3.8	300	39	14	3.8	75	27	23	9.4	w194018
w194019	140	15	380	32L	14	4.4	46	21	20	5.1	w194019
w194020	120	15	330	32L	10L	3.8	47	16	19	5.3	w194020
w194021	170	11	370	32L	10L	6.2	38	7.0L	22	6.6	w194021
w194880	120	17	56	22L	10L	1.4	26	7.0L	2.0L	6.5	w194880
w199324	170	26L	710	46	32	10	110	43	77	52	w199324
w199325	160	24L	680	45	36	9.2	150	33	95	12	w199325

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Ho-S (ppm)	In-S (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Sample number
w193983	7.0L	7.0L	150	140	2	460	14	17	46L	230	w193983
w193984	7.0L	7.0L	190	270	2	150	20	29	120	200	w193984
w193985	7.0L	7.0L	180	250	2	160	31	33	190	230	w193985
w193986	7.0L	7.0L	170	290	2	160	18	16	72	260	w193986
w193987	7.0L	7.0L	160	170	2	430	19	17	65	130	w193987
w193988	7.0L	7.0L	150	280	1	81	7.0	28	55	81	w193988
w193991	7.0L	7.0L	100	120	3	100	44	8	57	210	w193991
w193992	7.0L	7.0L	100	150	3	120	53	12	120	170	w193992
w193993	7.0L	7.0L	75	130	2	130	15	6	46L	110	w193993
w193994	7.0L	7.0L	73	140	2	110	36	10	69	140	w193994
w193995	7.0L	7.0L	100	190	2	140	19	3	57	150	w193995
w193996	7.0L	7.0L	85	230	2	96	15	5	46L	140	w193996
w193997	7.0L	7.0L	110	220	1	83	19	6	46L	140	w193997
w193998	7.0L	7.0L	81	130	1	130	10	26	46L	54	w193998
w193999	7.0L	7.0L	110	160	3	96	43	8	46L	110	w193999
w194000	7.0L	7.0L	57	130	.7	150	9.0	19	46L	56	w194000
w194001	7.0L	7.0L	110	230	1	190	23	18	46L	130	w194001
w194002	7.0L	7.0L	140	130	2	260	26	15	100	110	w194002
w194003	7.0L	7.0L	120	120	2	92	20	12	46L	80	w194003
w194004	10L	7.0L	120	260	3	140	36	13	110	220	w194004
w194005	7.0L	7.0L	130	190	3	110	43	9	100	170	w194005
w194006	7.0L	7.0L	130	300	3	150	37	8	120	240	w194006
w194007	10L	7.0L	150	180	3	400	56	11	130	190	w194007
w194008	100L	7.0L	140	170	5	560	64	11	120	210	w194008
w194009	7.0L	7.0L	190	200	4	71	56	15	46L	200	w194009
w194010	7.0L	7.0L	170	180	1	120	11	12	73	91	w194010
w194011	7.0L	7.0L	150	140	2	570	13	20	46L	160	w194011
w194012	7.0L	7.0L	75	210	.8	130	6.0	13	46L	48	w194012
w194013	7.0L	7.0L	69	190	.7	160	5.0	12	46L	40	w194013
w194014	7.0L	7.0L	110	270	1	93	12	11	52	88	w194014
w194015	7.0L	7.0L	100	120	1	160	28	11	56	140	w194015
w194016	7.0L	7.0L	110	270	2	130	17	16	46L	200	w194016
w194017	7.0L	7.0L	120	270	1	100	10	17	75	140	w194017
w194018	7.0L	7.0L	110	260	2	160	31	25	130	310	w194018
w194019	7.0L	7.0L	150	230	1	190	31	14	150	230	w194019
w194020	7.0L	7.0L	95	220	1	1,500	42	21	140	240	w194020
w194021	7.0L	7.0L	230	290	3	77	29	16	46L	190	w194021
w194880	7.0L	7.0L	67	170	.7	110	2.0L	12	46L	25	w194880
w199324	14	7.0L	87	410	4	140	120	13	140	520	w199324
w199325	13	7.0L	120	370	8	63	37	25	110	510	w199325

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Re-S (ppm)	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Sample number
w193983	86	68L	B	10L	30	20	12	1,300	4.3	65L	w193983
w193984	110	68L	B	10L	42	25	9.0	1,300	3.8	58L	w193984
w193985	79	68L	B	10L	34	22	7.0L	1,700	4.0	60L	w193985
w193986	120	68L	B	10L	37	22	12	1,300	3.7	56L	w193986
w193987	80	68L	B	10L	39	26	10	1,100	4.8	48L	w193987
w193988	76	68L	B	10L	36	20	10	640	3.3	33L	w193988
w193991	120	68L	B	10L	47	23	9.0	800	3.3	100L	w193991
w193992	83	68L	B	10L	41	28	7.0L	1,200	3.4	100L	w193992
w193993	59	68L	B	10L	33	17	7.0L	330	3.2	32L	w193993
w193994	61	68L	B	10L	27	16	7.0L	370	1.8	55L	w193994
w193995	73	68L	B	10L	32	19	7.0L	330	2.8	180	w193995
w193996	65	68L	B	10L	28	13	7.0L	390	2.3	23L	w193996
w193997	60	68L	B	10L	31	19	7.0L	420	2.9	29L	w193997
w193998	56	68L	B	10L	30	14	7.0L	260	2.0	15	w193998
w193999	69	68L	B	10L	29	21	10	720	5.3	79L	w193999
w194000	52	68L	270	10L	24	9.9	7.0L	250	1.4	25	w194000
w194001	50	68L	550L	10L	31	18	10	900	3.2	32L	w194001
w194002	76	68L	700L	10L	37	21	10	670	3.2	48L	w194002
w194003	67	68L	250	10L	34	20	7.0L	740	2.1	63	w194003
w194004	99	68L	1,100L	10L	35	26	15	860	5.9	88L	w194004
w194005	90	68L	1,100L	10L	29	26	7.0L	980	3.2	97L	w194005
w194006	90	68L	1,100L	10L	35	32	7.0L	980	6.5	97L	w194006
w194007	100	68L	1,400L	10L	33	33	12	1,500	6.1	91L	w194007
w194008	110	68L	1,500L	10L	32	41	12	1,200	9.1	140L	w194008
w194009	82	68L	1,500L	10L	41	48	7.0L	1,900	7.4	110L	w194009
w194010	59	68L	470L	10L	27	20	7.0L	630	3.3	33L	w194010
w194011	90	68L	910L	10L	30	19	10	950	3.7	56L	w194011
w194012	57	68L	280	10L	23	11	7.0L	230	1.4	25	w194012
w194013	50	68L	310	10L	22	10	7.0L	170	1.3	18	w194013
w194014	74	68L	240	10L	26	16	7.0L	360	2.3	17L	w194014
w194015	68	68L	260	10L	24	17	7.0L	380	2.1	21	w194015
w194016	110	68L	470L	10L	33	20	7.0L	360	3.1	47L	w194016
w194017	110	68L	360L	10L	33	22	7.0L	350	3.9	39L	w194017
w194018	93	68L	580L	10L	34	19	7.0L	590	3.8	130	w194018
w194019	99	68L	190	10L	29	25	9.0	650	3.8	38L	w194019
w194020	86	68L	180	10L	27	17	7.0L	460	2.1	32L	w194020
w194021	110	68L	1,600	10L	48	52	9.0	320	4.9	49L	w194021
w194880	34	68L	260	10L	24	8.2	4.0	230	1.2	12	w194880
w199324	130	68L	1,100L	10L	65	39	2.0L	3,600	8.7	130L	w199324
w199325	110	68L	840L	13	96	40	8.0	3,300	8.0	120L	w199325

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Tl-S (ppm)	Tm (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w193983	10L	5.0L	22	100	61	8.7	91	230	w193983
w193984	10L	5.0L	31	200	99	9.6	77	300	w193984
w193985	10L	5.0L	22	200	110	8.0	72	370	w193985
w193986	10L	5.0L	22	210	49	9.3	67	110	w193986
w193987	10L	5.0L	24	180	68	13	81	160	w193987
w193988	10L	5.0L	16	150	48	9.9	85	390	w193988
w193991	25	5.0L	43	180	70	17	280	66	w193991
w193992	10L	5.0L	45	200	110	14	120	88	w193992
w193993	28	5.0L	26	150	41	11	160	44	w193993
w193994	11	5.0L	27	180	65	7.3	86	120	w193994
w193995	10L	5.0L	17	180	30	8.5	98	53	w193995
w193996	12	5.0L	26	190	19	6.2	150	62	w193996
w193997	27	5.0L	22	180	27	7.8	180	54	w193997
w193998	10L	5.0L	15	180	32	6.1	160	230	w193998
w193999	10L	5.0L	24	150	28	11	95	74	w193999
w194000	10L	5.0L	14	180	26	4.2	110	130	w194000
w194001	10L	5.0L	14	170	59	8.4	120	220	w194001
w194002	10L	5.0L	25	220	66	7.9	57	110	w194002
w194003	10L	5.0L	19	170	30	8.3	100	130	w194003
w194004	10L	5.0L	88	230	72	12	95	75	w194004
w194005	24	5.0L	35	160	65	9.7L	78	70	w194005
w194006	10L	5.0L	35	250	100	13	86	110	w194006
w194007	10L	5.0L	42	220	98	15	140	80	w194007
w194008	10L	5.0L	32	180	100	14	130	71	w194008
w194009	10L	5.0L	52	230	82	22	140	70	w194009
w194010	10L	5.0L	11	140	62	8.9	38	95	w194010
w194011	10L	5.0L	19	85	69	7.4	200	230	w194011
w194012	10L	5.0L	11	150	17	4.5	98	64	w194012
w194013	10L	5.0L	10	130	20	4.2	96	55	w194013
w194014	10L	5.0L	21	160	31	6.3	100	74	w194014
w194015	12	5.0L	28	200	44	6.4	310	61	w194015
w194016	10L	5.0L	19	160	60	9.4	250	110	w194016
w194017	10L	5.0L	18	180	81	11	230	110	w194017
w194018	10L	5.0L	15	200	120	9.4	200	250	w194018
w194019	14	5.0L	29	230	100	8.9	520	100	w194019
w194020	11	5.0L	22	230	91	6.3	460	130	w194020
w194021	10L	5.0L	39	170	24	15	64	88	w194021
w194880	3.0L	5.0L	7.0	130	26	3.5	75	110	w194880
w199324	32	5.0L	48	400	300	35	280	120	w199324
w199325	3.0L	5.0L	56	450	300	40	370	190	w199325

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w199326	6.8	48	38	1.8	0.88	0.40	2.8	3.6	0.89	0.06	w199326
w199327	5.7	33	24	2.7	.41	.24	.19	34	.96	.05	w199327
w199328	3.4	42	33	5.3	.96	.40	.31	7.3	1.6	.24	w199328
w199329	7.6	23	17	1.5	.28	.18	.44	54	.66	.06	w199329
w199330	11.0	30	23	.66	.15	.12	.13	42	.37	.02	w199330
w199331	17.0	58	29	.60	.96	.32	3.7	2.7	1.3	.05	w199331
w199332	4.4	47	38	1.7	.48	.31	.60	3.0	.53	.06	w199332
w199000	6.8	50	35	.94	.48	1.2	1.4	5.2	1.0	.13	w199000
w199001	6.6	49	34	.98	.55	1.4	1.3	5.9	.97	.12	w199001
w199002	8.7	49	30	1.1	.99	.31	2.9	7.1	1.4	.23	w199002
w199003	7.2	52	33	.77	.80	.75	2.5	5.0	1.3	.22	w199003
w199004	12.7	36	28	4.6	1.8	.21	1.9	11	.61	.50	w199004
w199005	4.3	42	26	2.1	.61	.63	.87	19	1.3	.40	w199005
w199006	8.6	40	30	1.1	.66	.31	1.7	18	.86	.50	w199006
w199007	7.2	45	32	2.6	.71	.94	2.0	7.5	1.0	1.7	w199007
w199008	15.2	49	36	.83	.61	.35	1.5	3.6	1.5	.64	w199008
w199009	16.6	52	35	.61	.66	.32	1.5	3.4	1.6	.28	w199009
w199010	15.1	48	33	2.3	.95	.27	1.8	6.0	1.4	.39	w199010
w199011	12.1	43	27	2.2	.73	.33	2.8	16	.89	.28	w199011
w199012	6.8	41	30	2.1	.96	.59	2.8	15	.92	.23	w199012
w199013	9.5	35	19	8.4	1.1	.28	1.2	18	.74	.45	w199013
w199014	9.3	31	42	1.8	.46	.43	1.3	11	.59	.23	w199014
w199015	5.5	42	35	4.3	1.2	.74	1.5	3.9	.85	1.0	w199015
w199016	8.4	43	33	5.0	1.2	.64	1.4	3.2	.97	.25	w199016
w199017	7.0	44	33	5.0	.93	.39	1.4	3.3	1.0	.25	w199017
w199018	12.7	36	25	6.8	1.8	.32	1.9	13	.78	.26	w199018
w199019	3.4	37	24	3.1	.36	1.2	.85	25	.86	.08	w199019
w199020	42.7	53	35	.26	1.2	.22	3.8	3.0	1.2	.09	w199020
w199021	25.9	53	30	.54	.86	.26	3.5	5.9	1.2	.15	w199021
w199022	8.5	46	31	.91	.91	.79	2.6	14	.95	.40	w199022
w199023	5.9	45	35	1.3	.80	1.1	2.2	9.4	.90	.41	w199023
w199024	7.0	40	27	1.1	.80	.58	2.0	23	1.3	.47	w199024
w198544	10.7	48	37	.86	.58	.13	2.1	7.1	1.9	.06	w198544
w198545	18.4	51	32	.51	.51	.15	2.0	8.6	2.7	.06	w198545
w198546	13.1	55	27	.69	.40	.31	2.3	8.8	2.2	.98	w198546
w198547	14.6	64	26	.52	.28	.09	.60	1.9	2.6	.11	w198547
w198548	12.8	44	39	2.1	.60	.32	1.6	4.7	2.5	.11	w198548
w199418	16.9	54	34	2.4	.53	.32	2.8	2.7	2.0	1.0	w199418
w199419	12.3	58	31	1.9	.27	.22	1.6	2.0	2.2	.06	w199419
w199420	11.5	52	32	.86	.25	.12	1.2	8.7	2.7	.08	w199420

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	SO3 (percent)	Ag-S (ppm)	Au-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Bi-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Sample number
w199326	2.1	0.20	10L	500	430	42	15L	0.51	240	200	w199326
w199327	4.1	.10	10L	340	370	60	15L	1.4	320	98	w199327
w199328	6.9	1.1	10L	1,000	780	51	15L	1.4	320	400	w199328
w199329	2.4	.70	10L	310	2,700	20	15L	1.8	140	310	w199329
w199330	1.1	.20	10L	160	2,200	28	15L	6.0	150	820	w199330
w199331	.62	.30	10L	210	660	21	15L	.83	180	91	w199331
w199332	1.6	.70	10L	700	280	34	15L	1.9	110	340	w199332
w199000	1.5	2.1	10L	200	840	24	15L	1.9	340	88	w199000
w199001	1.4	.10L	10L	180	790	24	15L	1.6	390	92	w199001
w199002	2.0	.50	10L	87	730	21	15L	1.2	280	51	w199002
w199003	1.0	.40	10L	70	660	27	15L	.90	490	220	w199003
w199004	9.3	.30	10L	42	1,100	27	15L	2.4	320	39	w199004
w199005	3.1	.90	10L	180	470	39	15L	1.1	260	100	w199005
w199006	2.1	.40	10L	97	390	22	15L	1.1	200	62	w199006
w199007	3.0	.50	10L	130	1,100	18	15L	1.3	210	250	w199007
w199008	.47	.70	10L	110	950	16	15L	1.2	300	120	w199008
w199009	.70	.60	10L	78	520	14	15L	.80	310	87	w199009
w199010	3.6	.60	10L	75	870	10	15L	1.1	290	52	w199010
w199011	3.5	.20	10L	78	950	15	15L	1.5	200	30	w199011
w199012	3.3	.50	10L	120	1,100	18	15L	.90	190	44	w199012
w199013	14	.10L	10L	31	1,600	16	15L	2.4	330	76	w199013
w199014	6.2	.70	10L	32	1,400	29	15L	12	770	100	w199014
w199015	7.3	.40	10L	90	2,000	26	15L	1.8	550	290	w199015
w199016	7.5	.20	10L	51	1,300	20	15L	2.0	420	140	w199016
w199017	8.4	.50	10L	54	1,800	24	15L	1.5	460	200	w199017
w199018	11	.10L	10L	49	1,400	9.0	15L	1.5	170	83	w199018
w199019	5.3	.50	10L	67	780	52	15L	1.0	290	270	w199019
w199020	.36	.70	10L	76	450	10	15L	.45	250	20	w199020
w199021	2.1	.50	10L	63	2,200	40	15L	12	220	31	w199021
w199022	1.7	.60	10L	130	740	16	15L	1.6	360	190	w199022
w199023	2.1	.90	10L	170	950	22	15L	1.5	310	220	w199023
w199024	2.0	.40	10L	130	530	21	15L	1.5	260	49	w199024
w198544	1.1	.40	10L	200	270	12	15L	.60	190	140	w198544
w198545	.73	.30	10L	170	310	19	15L	.39	230	46	w198545
w198546	.97	.30	10L	1,000G	340	22	15L	.16	230	19	w198546
w198547	.54	.20	10L	140	200	13	15L	.23	240	45	w198547
w198548	2.8	.20	10L	210	460	13	15L	.72	290	41	w198548
w199418	.81	.20	10L	180	590	13	15L	.45	210	37	w199418
w199419	2.2	.30	10L	220	430	15	15L	.60	200	46	w199419
w199420	.95	.30	10L	200	250	50	15L	.60	190	93	w199420

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Cr (ppm)	Cs (ppm)	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Sample number
w199326	170	7.4	230	22L	10	5.9	69	13	3.0	7.4	w199326
w199327	120	11L	190	22L	10L	4.7	65	16	18	7.0	w199327
w199328	210	18L	430	33	14	7.4	110	22	30	8.8	w199328
w199329	93	9.2L	100	22L	10L	2.6	82	21	26	2.6	w199329
w199330	130	7.3L	100	22L	10L	2.9	58	15	110	2.7	w199330
w199331	160	12	160	22L	14	3.8	45	17	2.0	6.5	w199331
w199332	230	11L	500	38	26	6.1	71	26	24	9.1	w199332
w199000	190	4.4	740	22L	14	7.5	50	26	28	5.9	w199000
w199001	170	4.5	720	32	14	8.8	45	24	45	7.6	w199001
w199002	200	15	370	22L	10L	6.9	60	16	6.0	8.0	w199002
w199003	310	18	220	24	13	8.1	64	14	26	11	w199003
w199004	170	8.7	280	27	10L	7.4	27	28	2.0L	3.9	w199004
w199005	130	7.0	330	22L	10L	5.8	98	18	23	9.3	w199005
w199006	190	12	450	24	10	5.5	78	15	28	5.8	w199006
w199007	170	6.9	330	22L	10L	4.2	53	11	24	4.2	w199007
w199008	170	7.9	250	22L	10L	6.1	67	15	8.0	8.6	w199008
w199009	170	8.4	220	22L	13	5.4	39	17	2.0L	7.8	w199009
w199010	170	11	250	22L	10L	5.1	34	16	2.0L	8.6	w199010
w199011	110	8.3	600	22L	10L	4.3	50	12	14	4.1	w199011
w199012	160	8.8	690	30	10L	5.1	59	15	21	4.4	w199012
w199013	130	4.2	180	22L	10L	6.2	30	19	6.0	5.3	w199013
w199014	270	7.5	330	34	21	28	77	41	32	5.4	w199014
w199015	210	7.3	310	33	17	7.8	140	28	120	5.5	w199015
w199016	190	6.0	250	22L	10L	6.4	110	20	92	7.1	w199016
w199017	250	5.7	290	22L	10L	7.0	150	15	130	8.6	w199017
w199018	130	7.9	250	22L	10L	3.5	41	14	8.0	4.7	w199018
w199019	240	24L	210	33	21	11	120	24	65	12L	w199019
w199020	200	11	380	22L	10L	4.8	53	12	2.0L	5.6	w199020
w199021	140	10	290	37	19	12	36	43	2.0L	4.6	w199021
w199022	250	18	400	22L	10L	6.8	60	17	29	7.1	w199022
w199023	170	8.5	600	31	16	6.3	80	23	40	5.1	w199023
w199024	190	10	300	22L	10L	4.0	74	15	17	8.6	w199024
w198544	210	7.5	150	22L	10L	3.4	72	10	2.0	9.3	w198544
w198545	200	7.6	140	22L	10L	3.6	72	11	6.0	14	w198545
w198546	180	5.3	110	22L	10L	3.4	53	12	2.0	13	w198546
w198547	180	7.5L	160	22L	10L	4.1	38	9.0	2.0L	14	w198547
w198548	220	7.0	140	22L	10L	5.5	63	13	2.0L	13	w198548
w199418	190	7.7	100	22L	10	3.4	56	14	2.0	9.5	w199418
w199419	200	4.9	140	22L	10L	3.3	42	11	4.0	11	w199419
w199420	220	4.3	170	22L	10L	3.3	63	12	15	13	w199420

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Ho-S (ppm)	In-S (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Sample number
w199326	7.0L	7.0L	88	420	1	89	17	7	95	170	w199326
w199327	7.0L	7.0L	160	180	2	160	16	8	83	430	w199327
w199328	7.0L	7.0L	150	230	3	290	26	18	85	610	w199328
w199329	7.0L	7.0L	66	97	1	66	17	15	65	340	w199329
w199330	7.0L	7.0L	55	140	.9	51	69	5	57	1,000	w199330
w199331	7.0L	7.0L	82	150	2	82	10	13	130	150	w199331
w199332	8.0	7.0L	45	290	2	51	110	14	120	520	w199332
w199000	7.0L	7.0L	210	150	1	40	18	9	190	110	w199000
w199001	7.0L	7.0L	230	140	2	54	19	7	180	120	w199001
w199002	7.0L	7.0L	150	140	2	860	55	12	120	170	w199002
w199003	7.0L	7.0L	280	210	3	240	15	12	130	140	w199003
w199004	15L	7.0L	200	76	2	2,400	9.0	3	110	170	w199004
w199005	7.0L	7.0L	140	95	2	130	73	15	110	150	w199005
w199006	7.0L	7.0L	93	99	2	200	51	9	110	98	w199006
w199007	7.0L	7.0L	120	190	1	140	39	4	83	150	w199007
w199008	7.0L	7.0L	180	250	2	300	38	13	120	150	w199008
w199009	7.0L	7.0L	170	320	2	59	32	24	130	120	w199009
w199010	7.0L	7.0L	160	240	1	1,300	21	17	140	95	w199010
w199011	7.0L	7.0L	110	86	.8	2,300	45	5	110	130	w199011
w199012	7.0L	7.0L	100	84	1	860	100	7	150	150	w199012
w199013	15L	7.0L	150	67	1	3,400	21	5	100	180	w199013
w199014	8.0	7.0L	410	62	6	270	4.0	2	230	380	w199014
w199015	7.0L	7.0L	350	100	2	220	37	8	210	340	w199015
w199016	7.0L	7.0L	250	200	1	730	10	8	110	300	w199016
w199017	7.0L	7.0L	230	120	1	760	18	6	140	220	w199017
w199018	7.0L	7.0L	87	94	.8	11,000	9.0	4	56	130	w199018
w199019	11	7.0L	120	31	6	150	59	10	100	300	w199019
w199020	7.0L	7.0L	140	320	1	130	2.0L	7	110	67	w199020
w199021	8.0	7.0L	160	92	3	240	6.0	14	230	490	w199021
w199022	7.0L	7.0L	210	160	2	210	42	7	120	230	w199022
w199023	7.0L	7.0L	170	170	2	140	63	8	170	350	w199023
w199024	7.0L	7.0L	140	85	1	190	24	10	97	78	w199024
w198544	7.0L	7.0L	100	250	.9	46	18	20	71	310	w198544
w198545	7.0L	7.0L	110	190	2	66	16	30	55	90	w198545
w198546	7.0L	7.0L	120	120	2	28	7.0	27	82	41	w198546
w198547	7.0L	7.0L	120	210	1	61	7.0	33	60	110	w198547
w198548	7.0L	7.0L	150	300	2	40	9.0	23	96	86	w198548
w199418	7.0L	7.0L	130	220	1	61	6.0	25	53	93	w199418
w199419	7.0L	7.0L	120	120	.8	67	6.0	28	86	87	w199419
w199420	7.0L	7.0L	110	140	2	85	11	30	70	130	w199420

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Re-S (ppm)	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Sample number
w199326	77	68L	340L	10L	46	24	5.0	750	4.4	44L	w199326
w199327	37	68L	390L	10L	26	23	2.0L	680	3.5	53L	w199327
w199328	160	68L	560L	10L	62	32	6.0	3,200	5.9	88L	w199328
w199329	25	68L	300L	10L	25	12	N	550	6.6L	39L	w199329
w199330	120	68L	240L	10L	23	13	2.0L	180	5.5L	27L	w199330
w199331	79	68L	190	10L	34	18	7.0	390	3.5	18L	w199331
w199332	130	68L	340L	10L	68	23	6.0	760	6.8	68L	w199332
w199000	130	68L	1,100L	10L	54	35	4.0	770	4.4	44L	w199000
w199001	150	68L	920L	10L	56	42	3.0	630	6.1	45L	w199001
w199002	110	68L	560L	10L	52	29	4.0	640	4.6	34L	w199002
w199003	76	68L	720L	10L	92	40	7.0	530	5.6	42L	w199003
w199004	52	68L	460L	10L	31	35	2.0L	500	5.5	24L	w199004
w199005	79	68L	980L	10L	44	26	3.0	1,200	4.7	70L	w199005
w199006	61	68L	560L	10L	47	26	2.0L	590	3.5	35L	w199006
w199007	59	68L	790L	10L	39	22	2.0L	1,600	2.8	42L	w199007
w199008	67	68L	410L	10L	42	30	9.0	1,200	3.9	20L	w199008
w199009	64	68L	310L	10L	38	28	6.0	630	4.2	18L	w199009
w199010	58	68L	360L	10L	37	25	4.0	960	4.0	20L	w199010
w199011	82	68L	370L	10L	26	20	2.0L	630	2.5	25L	w199011
w199012	94	68L	660L	10L	38	24	2.0L	890	2.9	44L	w199012
w199013	42	68L	420L	10L	28	32	2.0L	730	5.3	32L	w199013
w199014	61	68L	670L	10L	110	130	2.0L	210	16	32L	w199014
w199015	79	68L	890L	10L	67	42	6.0	3,100	3.6	55L	w199015
w199016	79	68L	600L	10L	69	35	5.0	660	4.8	36L	w199016
w199017	85	68L	590L	10L	69	37	2.0L	3,100	4.3	43L	w199017
w199018	36	68L	340L	10L	30	16	2.0L	750	1.6	24L	w199018
w199019	58	68L	1,100L	10L	71	47	2.0L	1,100	8.8	88L	w199019
w199020	130	68L	200	10L	64	24	6.0	180	2.8	52	w199020
w199021	69	68L	140	10L	40	53	2.0L	400	7.7	23	w199021
w199022	88	68L	560L	10L	56	34	2.0L	860	3.5	35L	w199022
w199023	100	68L	710L	10L	53	32	2.0	1,200	5.1	51L	w199023
w199024	52	68L	530L	10L	41	21	2.0L	640	4.3	43L	w199024
w198544	80	68L	260L	10L	44	16	6.0	410	3.5	47	w198544
w198545	86	68L	110	10L	43	17	9.0	280	3.3	33	w198545
w198546	46	68L	270L	10L	40	17	6.0	430	6.1L	61	w198546
w198547	85	68L	210L	10L	43	18	8.0	350	4.1	55	w198547
w198548	70	68L	300L	10L	61	24	12	3,100	4.7	55	w198548
w199418	63	68L	180	10L	39	16	7.0	1,500	2.4	36	w199418
w199419	82	68L	330L	10L	37	15	7.0	680	2.4	49	w199419
w199420	79	68L	340L	10L	43	16	7.0	460	2.6	52	w199420

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Tl-S (ppm)	Tm (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w199326	3.0L	5.0L	19	320	99	12	64	130	w199326
w199327	140	5.0L	14	82	55	7.0	72	110	w199327
w199328	3.0L	5.0L	26	230	150	18	100	180	w199328
w199329	110	5.0L	13	85	65	6.6	620	98	w199329
w199330	120	5.0L	12	86	47	4.5	2,200	54	w199330
w199331	3.4	5.0L	15	290	110	12	380	130	w199331
w199332	3.0L	5.0L	25	510	190	18	570	150	w199332
w199000	7.0	5.0L	24	460	120	13	110	140	w199000
w199001	6.0	5.0L	30	490	120	15	100	120	w199001
w199002	7.0	5.0L	30	390	82	13	170	100	w199002
w199003	3.0L	5.0L	28	290	83	18	94	150	w199003
w199004	3.0L	5.0L	19	150	160	18	380	87	w199004
w199005	29	5.0L	23	240	97	14	76	160	w199005
w199006	3.0L	5.0L	24	370	96	14	160	130	w199006
w199007	4.0	5.0L	22	240	51	9.7	110	66	w199007
w199008	3.0L	5.0L	15	290	74	13	160	120	w199008
w199009	3.0L	5.0L	14	260	99	11	76	210	w199009
w199010	3.0L	5.0L	14	260	89	11	88	160	w199010
w199011	3.0L	5.0L	19	330	63	7.4	370	69	w199011
w199012	10L	5.0L	29	520	110	10	160	100	w199012
w199013	3.0L	5.0L	16	120	92	12	310	110	w199013
w199014	3.0L	5.0L	24	140	180	46	390	87	w199014
w199015	3.0L	5.0L	29	360	150	13	270	140	w199015
w199016	3.0L	5.0L	19	250	84	11	200	120	w199016
w199017	3.0	5.0L	33	410	65	10	300	110	w199017
w199018	3.0L	5.0L	14	140	53	6.3	200	75	w199018
w199019	29	5.0L	32	340	190	32	91	100	w199019
w199020	3.0L	5.0L	18	280	69	8.4	96	87	w199020
w199021	3.0L	5.0L	16	210	160	19	340	120	w199021
w199022	10	5.0L	29	380	87	13	98	120	w199022
w199023	3.0L	5.0L	34	560	110	14	84	140	w199023
w199024	3.0L	5.0L	21	240	73	11	77	140	w199024
w198544	14	5.0L	10	240	46	6.5	230	120	w198544
w198545	24	5.0L	13	190	46	9.2	75	240	w198545
w198546	23	5.0L	15	230	45	7.6	37	190	w198546
w198547	3.0L	5.0L	9.6	130	40	8.9	31	200	w198547
w198548	3.0L	5.0L	11	230	48	8.6	95	130	w198548
w199418	3.0L	5.0L	6.5	220	73	7.7	72	210	w199418
w199419	3.0L	5.0L	7.3	180	57	7.3	67	240	w199419
w199420	9.0	5.0L	7.8	200	73	12	33	190	w199420

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w199421	6.9	49	25	1.4	0.41	0.20	0.98	18	1.4	0.09	w199421
w199422	8.2	39	21	6.3	.91	.82	1.3	23	1.0	.04	w199422
w199425	13.2	57	33	.64	.51	.20	2.3	3.9	2.7	.06	w199425
w195104	9.1	57	24	.86	.71	.37	2.5	6.3	1.3	.08	w195104
w195105	8.9	52	26	1.3	1.3	.45	3.4	9.8	.98	.14	w195105
w195106	8.2	52	26	.76	1.3	.41	2.4	7.3	1.4	.06	w195106
w195107	6.3	51	30	1.3	.91	.64	1.6	6.6	1.5	.16	w195107
w195108	10.0	49	28	.75	1.5	.54	3.0	9.0	1.2	.02	w195108
w195109	3.5	B	B	B	2.5	1.2	B	B	B	B	w195109
w195110	12.2	45	21	1.1	1.3	.44	3.4	17	.84	.26	w195110
w195131	11.1	53	29	1.0	.99	.73	1.6	4.6	1.3	.10	w195131
w195132	8.8	50	32	.87	.96	.77	1.4	4.4	.76	.12	w195132
w201530	31.0	51	38	.25	.51	.17	2.0	3.3	1.9	.02	w201530
w201531	18.2	48	36	.41	.45	.15	1.2	8.2	.98	.02	w201531
w201532	26.1	55	29	.29	.80	.21	2.8	6.0	1.2	.01	w201532
w201533	9.4	35	22	5.6	2.0	.43	2.0	16	.93	.01	w201533
w201534	4.8	29	21	1.4	.35	.28	.72	40	.51	.01	w201534
w194951	7.5	34	22	1.5	1.1	.18	1.5	25	.95	.16	w194951
w194952	15.6	42	30	3.2	.85	.26	2.5	10	1.2	.26	w194952
w194953	28.3	54	27	.67	1.1	.29	2.9	5.0	2.0	.03	w194953
w194954	14.2	38	21	3.3	.80	.19	1.7	22	1.3	.11	w194954
w194955	12.9	41	27	1.1	.45	.21	1.2	18	1.9	.24	w194955
w194956	14.2	53	34	.69	.36	.09	1.3	2.6	2.2	.01	w194956
w194957	18.1	48	37	.59	.78	.22	2.9	2.7	2.1	.08	w194957
w194958	6.9	40	20	2.4	.65	.78	1.2	20	1.2	.48	w194958
w194959	8.4	30	15	1.5	.58	.32	1.6	35	.85	.11	w194959
w194960	8.5	34	18	1.8	.50	.48	1.0	29	1.1	.31	w194960
w194961	9.6	40	22	2.2	.76	.28	1.8	20	1.3	.90	w194961
w194962	6.8	45	23	2.5	.83	.20	2.1	13	1.3	1.2	w194962
w194963	10.1	26	16	4.6	.81	.73	.77	32	.90	.19	w194963
w194964	9.8	40	21	1.7	.80	.28	1.7	24	1.0	.56	w194964
w194965	7.7	35	20	2.2	.65	.70	1.3	25	1.1	.09	w194965
w194966	12.7	28	11	20	.76	.21	1.4	13	.50	.46	w194966
w194967	14.2	38	22	3.5	.65	.28	1.8	19	1.1	1.9	w194967
w194968	6.5	46	21	2.1	.68	.41	1.5	15	1.5	.10	w194968
w194969	8.6	37	18	8.2	.88	.78	1.1	15	1.1	.10	w194969
w194970	7.5	39	25	1.7	.53	.18	1.5	22	.90	.29	w194970
w194971	14.6	44	17	3.0	.73	.28	2.3	20	.88	.79	w194971
w194972	6.5	41	23	2.7	.80	.21	1.7	17	1.3	.53	w194972
w194973	6.3	50	26	1.9	.56	.64	1.8	6.6	1.5	1.3	w194973

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	SO3 (percent)	Ag-S (ppm)	Au-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Bi-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Sample number
w199421	1.8	0.10L	10L	370	450	11	15L	0.30	130	22	w199421
w199422	6.5	.10L	10L	500	610	6.0	15L	.70	110	29	w199422
w199425	.63	.20	10L	200	300	11	15L	.30	200	39	w199425
w195104	1.1	.10L	10L	47	760	18	15L	.39	200	99	w195104
w195105	1.4	.40	10L	49	950	19	15L	1.5	210	160	w195105
w195106	.90	.10L	10L	50	980	13	15L	.46	220	99	w195106
w195107	1.9	.30	10L	76	920	11	15L	.42	210	46	w195107
w195108	1.3	.30	10L	66	620	14	15L	3.2	220	110	w195108
w195109	B	.50	10L	88	1,700	33	15L	1.9	230	91	w195109
w195110	1.7	.20	10L	51	990	11	15L	.60	140	34	w195110
w195131	1.3	.20	10L	41	540	14	15L	.19	320	61	w195131
w195132	.88	.30	10L	47	530	16	15L	.67	370	59	w195132
w201530	.24	.20	10L	140	370	17	15L	.34	140	38	w201530
w201531	.50	.60	10L	190	490	13	15L	.78	150	51	w201531
w201532	.52	.20	10L	190	440	7.0	15L	.30	180	24	w201532
w201533	9.6	.20	10L	110	820	24	15L	1.2	140	36	w201533
w201534	2.4	1.3	10L	500	340	57	15L	1.3	270	570	w201534
w194951	2.5	.10L	10L	190	3,000	15	15L	1.0	130	170	w194951
w194952	3.2	.40	10L	130	380	10	15L	.55	170	45	w194952
w194953	.80	.10	10L	110	380	8.0	15L	.28	140	28	w194953
w194954	3.8	.60	10L	99	200	6.0	15L	.65	130	29	w194954
w194955	1.3	.20	10L	79	220	13	15L	.70	180	81	w194955
w194956	.60	.20	10L	160	250	12	15L	.70	200	56	w194956
w194957	.53	.10	10L	150	450	10	15L	.33	170	29	w194957
w194958	2.2	.20	10L	700	1,100	11	15L	.50	100	38	w194958
w194959	2.4	.20	10L	310	540	10	15	1.1	83	27	w194959
w194960	2.7	.10L	10L	320	690	9.0	15L	.80	110	21	w194960
w194961	2.7	.10L	10L	220	710	9.0	15L	.90	100	22	w194961
w194962	3.0	.20	10L	340	1,000	12	15L	.86	120	44	w194962
w194963	7.5	.10L	10L	370	880	3.0	15L	.80	89	43	w194963
w194964	2.7	.10L	10L	240	590	11	15L	.48	100	30	w194964
w194965	3.7	.20	10L	370	960	6.0	15L	.53	100	18	w194965
w194966	13	.10L	10L	160	350	9.0	15L	.42	55	15	w194966
w194967	3.8	.10L	10L	190	970	8.0	15L	.42	120	25	w194967
w194968	3.5	.20	10L	400	1,300	11	15L	.43	140	23	w194968
w194969	6.2	.10L	10L	390	940	5.0	15L	.70	100	21	w194969
w194970	2.5	.20	10L	160	420	15	32L	.70	130	31	w194970
w194971	3.5	.10L	10L	120	390	8.0	15L	.67	100	35	w194971
w194972	3.8	.10	10L	280	490	8.0	15L	.70	110	25	w194972
w194973	1.9	.20	10L	390	1,400	15	15L	.70	130	32	w194973

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Cr (ppm)	Cs (ppm)	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Sample number
w199421	140	2.9	96	22L	10L	2.3	41	7.0L	35	8.7	w199421
w199422	130	6.1	72	22L	10L	2.1	39	12	25	4.9	w199422
w199425	190	8.3	110	22L	10L	2.7	49	14	2.0L	12	w199425
w195104	130	13	91	22L	10L	3.1	28	15	3.0	7.7	w195104
w195105	110	22	210	22L	10L	3.8	30	16	2.0L	5.6	w195105
w195106	130	18	140	22L	10L	3.5	29	13	2.0L	7.3	w195106
w195107	130	9.5	140	22L	10L	3.2	27	14	2.0L	7.9	w195107
w195108	130	24	190	22L	10L	3.4	32	18	2.0L	7.0	w195108
w195109	89	5.7	560	31	18	4.9	23	34	2.0	5.7	w195109
w195110	110	14	120	22L	10L	2.1	28	7.0L	2.0L	4.1	w195110
w195131	140	7.2	240	22L	10L	4.8	22	12	2.0L	8.1	w195131
w195132	140	11	200	22L	10L	6.4	17	14	2.0L	5.7	w195132
w201530	200	6.1	82	22L	10L	2.7	75	15L	7.0	8.4	w201530
w201531	150	7.7	160	22L	10L	2.9	55	15L	3.0	4.9	w201531
w201532	160	13	94	22L	10L	3.0	61	15L	2.0	6.9	w201532
w201533	130	9.6	94	22L	10L	3.7	54	22	5.0	5.3	w201533
w201534	190	4.2	310	52	31	11	120	40	50	4.2	w201534
w194951	130	6.7	79	23	10L	3.1	33	18	30	5.3	w194951
w194952	150	8.3	190	22L	10L	3.7	51	13	3.0	5.8	w194952
w194953	160	11	91	22L	10L	2.5	57	10	5.0	8.8	w194953
w194954	120	6.3	110	22L	10L	2.3	41	13	2.0	5.6	w194954
w194955	180	3.9	130	22L	10L	4.0	48	17	11	9.3	w194955
w194956	210	4.9	140	22L	10L	3.0	51	11	2.0L	11	w194956
w194957	180	10	110	22L	10L	2.5	47	12	2.0L	9.4	w194957
w194958	130	4.3	60	22L	10L	1.7	32	19	17	5.8	w194958
w194959	110	7.1	53	22L	10L	2.0	35	18	5.0	4.8	w194959
w194960	150	4.7	83	22L	10L	2.1	31	18	25	4.7	w194960
w194961	120	8.3	80	22L	10L	1.8	37	10	6.0	7.3	w194961
w194962	130	7.4	83	22L	10L	2.1	36	13	41	5.9	w194962
w194963	88	3.0	61	22L	10L	1.5	24	21	16	4.0	w194963
w194964	110	8.2	68	22L	10L	1.7	28	14	32	5.1	w194964
w194965	120	5.2	59	22L	10L	1.6	33	15	15	5.2	w194965
w194966	60	4.7	60	22L	10L	1.0	22	13	30	3.1	w194966
w194967	120	6.3	53	22L	10L	2.0	30	12	8.0	5.6	w194967
w194968	170	6.2	72	22L	10L	2.6	49	15	11	9.2	w194968
w194969	120	4.7	77	22L	10L	2.0	27	13	2.0	5.8	w194969
w194970	130	8.0	67	22L	10L	2.9	38	14	58	5.3	w194970
w194971	100	8.2	77	22L	10L	1.9	23	13	2.0	4.8	w194971
w194972	130	7.7	83	22L	10L	1.8	23	14	3.0	6.2	w194972
w194973	150	9.5	89	22L	10L	1.6	39	14	47	6.3	w194973

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Ho-S (ppm)	In-S (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Sample number
w199421	7.0L	7.0L	72	150	1	380	29	15	69	68	w199421
w199422	7.0L	7.0L	61	110	1	230	7.0	10	46L	46	w199422
w199425	7.0L	7.0L	130	120	2	59	9.0	34	88	110	w199425
w195104	7.0L	7.0L	99	120	1	130	7.0	22	96	130	w195104
w195105	7.0L	7.0L	110	120	1	160	18	14	120	98	w195105
w195106	7.0L	7.0L	120	150	1	140	9.0	31	100	150	w195106
w195107	7.0L	7.0L	110	170	2	130	14	34	110	110	w195107
w195108	7.0L	7.0L	120	210	1	120	41	26	120	150	w195108
w195109	9.0	7.0L	140	170	3	480	53	34	170	140	w195109
w195110	7.0L	7.0L	74	65	.8	160	27	14	90	87	w195110
w195131	7.0L	7.0L	170	180	2	91	7.0	9	94	55	w195131
w195132	7.0L	7.0L	240	160	2	110	16	5	130	76	w195132
w201530	7.0L	7.0L	68	350	1	40	2.0L	21	53	130	w201530
w201531	7.0L	7.0L	77	290	1	34	9.0	11	60	130	w201531
w201532	7.0L	7.0L	100	130	1	50	6.0	16	99	77	w201532
w201533	7.0L	7.0L	85	63	1	570	28	15	81	160	w201533
w201534	7.0L	7.0L	120	110	8	66	130	12	160	1,200	w201534
w194951	7.0L	7.0L	67	120	1	280	110	9	78	270	w194951
w194952	7.0L	7.0L	96	200	1	130	17	5	49	110	w194952
w194953	7.0L	7.0L	78	390	1	92	7.0	16	63	85	w194953
w194954	7.0L	7.0L	70	130	.7	200	10	9	46L	50	w194954
w194955	7.0L	7.0L	93	230	2	47	18	15	73	210	w194955
w194956	7.0L	7.0L	110	97	1	130	6.0	31	84	88	w194956
w194957	7.0L	7.0L	99	340	1	69	3.0	36	91	69	w194957
w194958	7.0L	7.0L	58	97	1	170	16	27	80	90	w194958
w194959	7.0L	7.0L	48	50	1	240	19	12	57	71	w194959
w194960	7.0L	7.0L	59	130	1	330	13	9	58	44	w194960
w194961	7.0L	7.0L	63	160	1	260	12	12	68	53	w194961
w194962	7.0L	7.0L	74	120	1	180	22	16	87	83	w194962
w194963	7.0L	7.0L	50	110	1	370	12	10	46L	48	w194963
w194964	7.0L	7.0L	51	110	1	250	25	23	71	79	w194964
w194965	7.0L	7.0L	65	94	1	210	13	8	65	52	w194965
w194966	7.0L	7.0L	31	32	.8	2,300	19	8	46L	33	w194966
w194967	7.0L	7.0L	70	130	.7	220	3.0	7	65	46	w194967
w194968	7.0L	7.0L	77	100	2	170	15	20	73	67	w194968
w194969	7.0L	7.0L	58	110	1	260	3.0	13	46L	42	w194969
w194970	7.0L	7.0L	80	120	1	150	18	9	68	77	w194970
w194971	7.0L	7.0L	62	63	.7	550	17	7	61	60	w194971
w194972	7.0L	7.0L	62	140	2	140	10	12	46L	47	w194972
w194973	7.0L	7.0L	63	110	2L	79	22	22	76	79	w194973

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Re-S (ppm)	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Sample number
w199421	21	68L	410L	10L	26	13	2.0L	700	1.4	43L	w199421
w199422	27	68L	550L	10L	24	11	2.0L	1,300	6.1L	37L	w199422
w199425	79	68L	330L	10L	36	15	11	390	2.3	53	w199425
w195104	33	68L	44L	10L	23	16	4.0	1,400	3.3	33L	w195104
w195105	140	68L	67L	10L	33	22	2.0L	1,600	3.4	34L	w195105
w195106	48	68L	73L	10L	26	20	5.0	1,400	3.7	37L	w195106
w195107	50	68L	79L	10L	25	13	7.0	3,600	6.3L	48L	w195107
w195108	61	68L	60	10L	27	19	3.0	1,200	2.0	30L	w195108
w195109	330	88	170L	10L	23	23	2.0L	8,000	11L	86L	w195109
w195110	20	68L	57L	10L	21	11	2.0L	2,500	1.6	25L	w195110
w195131	72	68L	250L	10L	39	27	4.0	1,200	3.6	27L	w195131
w195132	67	68L	300L	10L	35	35	5.0	850	4.5	34L	w195132
w201530	77	68L	130	10L	39	14	9.0	220	1.9	42	w201530
w201531	67	68L	110	10L	40	15	2.0	270	2.2	38	w201531
w201532	33	68L	270	10L	35	15	3.0	260	2.3	27	w201532
w201533	31	68L	320L	10L	34	18	2.0L	1,500	3.2	32L	w201533
w201534	74	68L	620L	10L	58	46	N	420	13	63L	w201534
w194951	110	68L	680L	10L	24	13	2.0L	610	2.7	40L	w194951
w194952	86	68L	470L	10L	36	17	2.0L	700	2.6	32	w194952
w194953	64	68L	290L	10L	31	12	4.0	250	1.8	46	w194953
w194954	50	68L	410L	10L	26	11	2.0L	360	1.4	35	w194954
w194955	78	68L	450L	10L	43	18	2.0L	810	3.1	47	w194955
w194956	120	68L	390L	10L	42	15	8.0	320	2.1	49	w194956
w194957	88	68L	340L	10L	36	13	6.0	280	2.2	33	w194957
w194958	56	68L	830L	10L	26	10	2.0L	2,100	1.4	72	w194958
w194959	36	68L	580L	10L	26	8.3	2.0L	570	2.4	36L	w194959
w194960	43	68L	550L	10L	24	9.4	2.0L	1,400	1.2	35L	w194960
w194961	53	68L	430L	10L	27	10	2.0L	1,500	2.1	31L	w194961
w194962	58	68L	460L	10L	29	12	2.0L	2,000	1.5	44L	w194962
w194963	36	68L	510L	10L	17	7.9	2.0L	1,300	5.0L	30L	w194963
w194964	50	68L	410L	10L	26	9.2	2.0L	1,400	2.0	31L	w194964
w194965	36	150L	610L	10L	22	9.1	4.0	790	6.5L	39L	w194965
w194966	67	68L	280L	10L	16	6.3	2.0L	490	1.6	24L	w194966
w194967	36	68L	300L	10L	30	11	2.0L	3,200L	1.4	21L	w194967
w194968	50	68L	510L	10L	35	14	3.0	1,400	1.5	46L	w194968
w194969	46	68L	510L	10L	23	9.3	2.0L	1,200	1.2	35L	w194969
w194970	45	68	480L	10L	37	15	2.0L	650	2.7	40L	w194970
w194971	40	68L	290L	10L	23	10	2.0L	300	1.4	21L	w194971
w194972	46	68L	450L	10L	25	11	2.0L	1,000	6.2L	46L	w194972
w194973	67	68L	520L	10L	33	11	2.0	3,200	1.6	48L	w194973

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Tl-S (ppm)	Tm (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w199421	29	5.0L	2.9	150	45	5.8	66	140	w199421
w199422	3.0L	5.0L	2.4L	78	31	4.9	82	120	w199422
w199425	3.0L	5.0L	6.8	200	59	6.8	55	200	w199425
w195104	3.0L	5.0L	12	150	72	7.7	130	210	w195104
w195105	4.0	5.0L	27	150	71	7.9	55	170	w195105
w195106	3.0L	5.0L	15	160	64	7.3	51	280	w195106
w195107	3.0L	5.0L	21	140	76	7.9	71	340	w195107
w195108	17	5.0L	38	160	81	6.0	150	320	w195108
w195109	3.0L	5.0L	29	130	170	11	130	460	w195109
w195110	3.0L	5.0L	17	150	49	4.9	120	120	w195110
w195131	3.0L	5.0L	24	140	58	9.9	68	95	w195131
w195132	3.0L	5.0L	15	160	87	10	81	110	w195132
w201530	3.0L	5.0L	9.0	230	39	7.1	52	100	w201530
w201531	3.0L	5.0L	12	220	41	5.5	84	72	w201531
w201532	3.0L	5.0L	7.7	250	59	7.3	120	140	w201532
w201533	3.0L	5.0L	7.4	200	100	8.5	290	200	w201533
w201534	80	5.0L	8.3	200	280	44	620	100	w201534
w194951	36	5.0L	12	110	79	8.0	780	91	w194951
w194952	3.0L	5.0L	11	220	54	7.1	92	74	w194952
w194953	3.0L	5.0L	8.1	180	44	6.4	130	110	w194953
w194954	3.0L	5.0L	13	110	24	4.9	140	59	w194954
w194955	3.0L	5.0L	11	190	66	9.3	130	120	w194955
w194956	3.0L	5.0L	13	200	57	6.3	47	220	w194956
w194957	3.0L	5.0L	11	230	67	6.6	56	240	w194957
w194958	3.0L	5.0L	10	150	72	7.2	71	340	w194958
w194959	3.0L	5.0L	11	130	54	6.0	100	130	w194959
w194960	3.0L	5.0L	14	92	35	3.5	63	120	w194960
w194961	3.0L	5.0L	9.4	120	32	6.3	120	82	w194961
w194962	3.0L	5.0L	13	170	50	5.9	230	230	w194962
w194963	3.0L	5.0L	50	61	24	3.0	150	86	w194963
w194964	3.0L	5.0L	9.2	110	57	5.1	150	290	w194964
w194965	3.0L	5.0L	14	98	32	5.2	87	80	w194965
w194966	3.0L	5.0L	7.1	54	36	3.9	130	94	w194966
w194967	3.0L	5.0L	8.5	100	32	4.9	80	91	w194967
w194968	3.0L	5.0L	15	220	62	6.2	95	220	w194968
w194969	3.0L	5.0L	10	87	31	4.7	79	95	w194969
w194970	3.0L	5.0L	15	130	61	8.0	130	100	w194970
w194971	3.0L	5.0L	12	92	37	4.1	220	98	w194971
w194972	3.0L	5.0L	12	110	37	4.6	130	140	w194972
w194973	3.0L	5.0L	14	220	45	4.8	130	190	w194973

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w194974	7.5	30	17	4.7	0.70	0.36	1.5	26	1.1	0.41	w194974
w194975	7.4	40	22	5.4	.80	.36	1.8	16	1.1	.75	w194975
w194976	8.6	37	22	4.6	.70	.47	1.3	18	1.0	.04	w194976
w194977	6.6	28	19	8.1	.81	.82	1.4	21	.93	1.3	w194977
w194978	16.2	45	20	.80	.53	.25	2.3	22	1.1	.05	w194978
w194979	12.1	49	19	1.8	.83	.45	2.5	15	1.2	.35	w194979
w194980	6.3	33	21	4.1	1.0	.43	2.1	22	.97	.54	w194980
w194981	7.4	30	17	3.8	.76	.55	1.4	29	.87	.89	w194981
w194982	6.3	24	15	7.6	.76	.21	1.3	31	.74	.25	w194982
w194983	8.0	30	15	4.4	.78	.17	1.5	30	.85	.59	w194983
w194984	9.4	59	21	.83	.88	.29	2.4	6.6	1.2	B	w194984
w194985	7.5	55	23	1.2	.95	.54	2.7	4.9	1.6	.01	w194985
w194986	8.1	50	29	.74	.98	.50	3.3	6.8	1.2	.02	w194986
w194987	3.1	41	26	1.6	1.2	.87	3.3	15	1.1	.04	w194987
w194988	3.2	44	28	2.8	1.0	2.1	.77	7.8	1.6	.10	w194988
w194989	4.8	51	28	1.2	.36	.56	.72	8.8	1.4	.05	w194989
w194990	4.3	42	22	1.0	.80	.94	2.8	17	1.1	.19	w194990
w194991	8.6	48	24	.72	.33	.47	.66	16	1.6	.07	w194991
w194992	16.5	51	26	1.4	.63	.41	2.3	9.9	1.8	1.1	w194992
w194993	10.6	59	29	.66	.36	.76	1.1	1.6	3.6	.27	w194993
w194994	18.2	57	30	.49	.80	.37	3.4	1.9	1.7	.06	w194994
w194995	28.3	57	31	.35	.76	.24	3.4	2.1	1.7	.01	w194995
w194996	9.5	56	32	.62	.58	.57	1.9	2.3	2.0	.25	w194996
w194997	45.0	63	25	.28	.61	.48	3.1	2.4	1.4	.02	w194997
w194998	5.2	60	28	1.0	.36	1.0	1.1	1.9	1.7	.06	w194998
w194999	8.7	59	29	.67	.40	.62	1.5	2.6	1.8	.06	w194999
w195000	6.5	51	33	1.5	.63	.41	2.3	2.7	1.1	.01	w195000
w195001	10.5	58	26	.89	.65	.51	2.2	3.7	1.9	.03	w195001
w195002	3.9	49	33	2.7	.68	.69	1.4	4.4	.95	.06	w195002
w195003	23.2	55	28	.46	1.0	.52	4.1	4.5	1.1	.06	w195003
w195004	7.2	67	24	1.1	.38	.56	1.3	1.9	1.7	.04	w195004
w195009	7.2	43	13	1.8	.71	.56	2.0	26	.52	.17	w195009
w195010	6.2	49	37	1.7	.76	.65	2.0	3.5	3.0	.06	w195010
w195011	10.1	54	26	1.1	.46	.40	1.2	8.8	2.1	.04	w195011
w195012	2.9	35	20	4.2	.46	.93	1.7	23	.62	.11	w195012
w195013	4.5	38	16	4.2	1.3	1.2	2.7	23	.68	1.1	w195013
w195014	6.7	62	19	1.9	.63	.80	1.6	7.0	1.8	.05	w195014
w195015	5.8	27	17	4.0	.86	.70	1.3	32	.78	.14	w195015
w195016	20.6	59	27	.96	.85	.85	2.5	4.1	1.5	.22	w195016
w195017	10.6	46	22	1.4	.51	.51	1.7	18	1.8	.17	w195017

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	SO3 (percent)	Ag-S (ppm)	Au-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Bi-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Sample number
w194974	6.7	0.10L	10L	320	940	9.0	15L	0.68	120	17	w194974
w194975	4.0	.10L	10L	180	740	8.0	15L	.65	120	30	w194975
w194976	5.4	.10L	10L	290	640	6.0	15L	.75	100	27	w194976
w194977	7.2	.10L	10L	370	1,300	5.0	15L	.65	120	30	w194977
w194978	1.1	.10L	10L	120	340	5.0	15L	1.7	110	64	w194978
w194979	2.5	.10	10L	190	780	4.0	15L	.52	110	27	w194979
w194980	6.0	.10L	10L	360	1,200	4.0	15L	.66	110	32	w194980
w194981	5.6	.10L	10L	350	1,000	5.0	15L	.58	110	41	w194981
w194982	8.5	.10L	10L	290	1,100	11	15L	.62	95	29	w194982
w194983	6.0	.10L	10L	230	680	9.0	15L	.55	87	16	w194983
w194984	1.3	.10	10L	74	440	39	15L	.27	150	77	w194984
w194985	1.6	.20	10L	110	670	24	15L	.57	190	72	w194985
w194986	1.1	.30	10L	53	680	17	15L	.52	210	99	w194986
w194987	2.4	.80	10L	53	520	40	15L	1.8	190	100	w194987
w194988	5.0	.30	10L	120	920	60	15L	1.2	220	190	w194988
w194989	1.6	2.0	10L	37	580	44	15L	1.3	350	230	w194989
w194990	1.5	.50	10L	45	690	40	15L	2.1	190	91	w194990
w194991	.80	.50	10L	38	240	18	15L	1.3	290	79	w194991
w194992	.63	.60	10L	52	790	12	15L	.84	260	75	w194992
w194993	.30	.30	10L	140	620	9.0	15L	.40	210	51	w194993
w194994	.50	.10L	10L	130	570	9.0	15L	.40	190	15	w194994
w194995	.18	.10L	10L	85	450	11	15L	.17	160	53	w194995
w194996	.56	.20	10L	180	500	10	15L	.50	240	75	w194996
w194997	.16	.10L	10L	76	330	4.0	15L	.12	120	11	w194997
w194998	.88	.10	10L	210	420	13	15L	.62	210	92	w194998
w194999	.65	.10L	10L	53	390	15	15L	.58	470	41	w194999
w195000	1.7	.10	10L	140	600	220	15L	.23	250	200	w195000
w195001	1.0	.20	10L	95	480	31	15L	.65	200	87	w195001
w195002	3.6	.50	10L	170	660	18	15L	1.1	310	210	w195002
w195003	.78	.20	10L	83	460	18	15L	.72	130	54	w195003
w195004	1.2	.30	10L	87	470	43	15L	.35	140	72	w195004
w195009	2.8	.10	10L	420	240	35	15L	1.5	97	110	w195009
w195010	1.9	1.3	10L	380	520	75	15L	.99	180	210	w195010
w195011	1.2	.60	10L	330	420	14	15L	.78	200	47	w195011
w195012	6.8	1.7	10L	1,300	1,500	140	15L	2.4	170	300	w195012
w195013	5.4	.20	10L	900	680	44	15L	.97	110	150	w195013
w195014	2.9	.50	10L	700	680	37	15L	.38	210	58	w195014
w195015	6.5	.50	10L	1,000	680	38	15L	.42	140	33	w195015
w195016	.84	.80	10L	130	560	48	15L	1.3	230	40	w195016
w195017	2.2	.60	10L	240	1,300	41	15L	.42	170	38	w195017

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Cr (ppm)	Cs (ppm)	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Sample number
w194974	96	4.0	73	22L	10L	2.0	24	13	18	5.3	w194974
w194975	150	9.5	83	22L	10L	2.3	26	14	19	5.4	w194975
w194976	140	5.8	69	22L	10L	2.0	22	14	2.0	5.8	w194976
w194977	150	6.1	81	22L	10L	2.7	33	15	5.0	6.1	w194977
w194978	130	8.6	62	22L	10L	2.1	24	14	13	5.6	w194978
w194979	110	6.6	72	22L	10L	2.1	21	14	6.0	7.4	w194979
w194980	110	6.3	74	22L	10L	2.2	27	7.0L	4.0	4.8	w194980
w194981	120	5.4	84	22L	10L	2.6	24	7.0L	8.0	4.1	w194981
w194982	92	4.8	60	22L	10L	1.7	35	14	78	3.2	w194982
w194983	100	6.3	54	22L	10L	1.3	23	14	30	5.0	w194983
w194984	130	12	190	22L	10L	2.8	33	11	14	7.4	w194984
w194985	130	13	220	22L	10L	3.2	32	10	4.0	8.0	w194985
w194986	160	16	210	22L	10L	4.8	37	17	2.0	4.9	w194986
w194987	150	26	330	22L	10L	4.2	32	12	9.0	6.5	w194987
w194988	180	6.3	310	22L	10L	4.7	52	21	84	9.4	w194988
w194989	170	4.2	920	22L	11	7.7	31	19	23	8.3	w194989
w194990	140	14	310	22L	10L	4.4	37	15	34	7.0	w194990
w194991	140	4.7	310	22L	13	5.7	25	24	2.0L	9.3	w194991
w194992	180	9.1	230	22L	11	5.2	36	15	2.0	9.1	w194992
w194993	250	21	170	22L	10L	3.8	32	10	2.0L	10	w194993
w194994	170	3.3	67	22L	10L	2.7	32	8.0	2.0L	12	w194994
w194995	170	10	65	22L	10L	2.3	32	8.0	2.0L	7.4	w194995
w194996	200	11	120	22L	10L	3.9	37	8.0	2.0L	9.5	w194996
w194997	130	11	41	22L	10L	1.7	22	7.0	2.0L	6.4	w194997
w194998	160	3.8	150	22L	10L	4.2	26	12	2.0L	9.6	w194998
w194999	150	4.6	190	22L	10L	4.0	17	12	2.0L	15	w194999
w195000	180	9.2	220	25	17	7.8	170	19	82	6.2	w195000
w195001	170	9.5	170	22L	10L	3.2	30	9.0	7.0	8.6	w195001
w195002	130	5.1	170	22L	10L	7.7	31	13	3.0	5.1	w195002
w195003	140	17	140	22L	10L	2.1	46	9.0	8.0	5.2	w195003
w195004	130	4.2	160	22L	10	3.5	32	11	2.0	8.3	w195004
w195009	110	6.9	170	22	10L	3.8	66	18	33	2.8	w195009
w195010	230	3.2	270	22L	17	5.0	69	16	53	13	w195010
w195011	160	4.0	370	22L	10L	3.8	39	18	2.0	9.9	w195011
w195012	120	6.9	240	67	43	10	260	46	150	3.4	w195012
w195013	93	8.9	240	22	10L	2.9	110	20	43	4.4	w195013
w195014	140	4.5	300	22L	14	4.2	53	24	43	15	w195014
w195015	90	3.4	100	22L	10L	3.6	85	21	44	5.2	w195015
w195016	120	6.8	200	30	13	4.9	40	23	2.0L	6.8	w195016
w195017	150	3.8	240	22L	12	3.1	71	17	24	8.5	w195017

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Ho-S (ppm)	In-S (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Sample number
w194974	7.0L	7.0L	67	66	1L	290	8.0	9	46L	34	w194974
w194975	7.0L	7.0L	68	110	1	300	8.0	5	46L	48	w194975
w194976	7.0L	7.0L	70	130	1	410	4.0	8	56	42	w194976
w194977	7.0L	7.0L	76	45	2	260	6.0	3	46L	41	w194977
w194978	7.0L	7.0L	56	100	.6	190	3.0	6	46L	56	w194978
w194979	7.0L	7.0L	58	78	.8	200	7.0	9	74	50	w194979
w194980	7.0L	7.0L	63	66	2	200	7.0	2L	46L	45	w194980
w194981	7.0L	7.0L	68	78	1	250	14	4	61	57	w194981
w194982	7.0L	7.0L	48	46	2	590	12	4	46L	43	w194982
w194983	7.0L	7.0L	50	65	1	380	32	4	49	34	w194983
w194984	7.0L	7.0L	96	140	1	93	4.0	10	70	92	w194984
w194985	7.0L	7.0L	110	130	1	130	4.0	12	69	89	w194985
w194986	7.0L	7.0L	110	190	2	93	16	14	110	130	w194986
w194987	7.0L	7.0L	97	190	3	110	26	3	53	91	w194987
w194988	7.0L	7.0L	130	170	3	550	11	26	130	340	w194988
w194989	7.0L	7.0L	210	260	2	57	55	11	110	380	w194989
w194990	7.0L	7.0L	93	170	2	99	43	7	88	140	w194990
w194991	7.0L	7.0L	150	210	2	190	38	28	110	140	w194991
w194992	7.0L	7.0L	160	240	2	64	16	25	97	110	w194992
w194993	7.0L	7.0L	110	230	2	19	6.0	30	79	62	w194993
w194994	7.0L	7.0L	110	120	1	38	4.0	18	47	51	w194994
w194995	7.0L	7.0L	92	180	1	84	2.0L	18	53	50	w194995
w194996	7.0L	7.0L	160	150	1	29	6.0	18	63	110	w194996
w194997	7.0L	7.0L	84	170	.7	120	2.0L	8	46L	29	w194997
w194998	7.0L	7.0L	150	150	2	29	9.0	20	73	160	w194998
w194999	7.0L	7.0L	300	140	3	30	4.0	12	56	42	w194999
w195000	7.0L	7.0L	170	200	5	68	18	10	120	120	w195000
w195001	7.0L	7.0L	140	110	1	37	6.0	16	74	120	w195001
w195002	7.0L	10	180	140	3	55	26	4	120	310	w195002
w195003	7.0L	7.0L	91	140	2	94	8.0	6	54	110	w195003
w195004	7.0L	7.0L	97	130	1	36	9.0	17	85	110	w195004
w195009	7.0L	7.0L	56	66	4	1,900	72	8	46L	250	w195009
w195010	7.0L	7.0L	110	68	3	1,900	10	52	120	300	w195010
w195011	7.0L	7.0L	130	270	2	38	19	25	97	150	w195011
w195012	19	7.0L	69	180	10	55	170	14	93	700	w195012
w195013	7.0L	7.0L	67	89	2	1,400	41	14	47	140	w195013
w195014	7.0L	7.0L	130	150	3	72	7.0	40	150	160	w195014
w195015	7.0L	7.0L	86	130	2	240	20	21	56	68	w195015
w195016	7.0L	7.0L	160	130	1	240	3.0	33	160	120	w195016
w195017	7.0L	7.0L	120	190	2	78	22	17	89	120	w195017

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Re-S (ppm)	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Sample number
w194974	36	150L	920L	10L	23	9.3	2.0L	1,500	4.0L	40L	w194974
w194975	53	68L	890L	10L	30	12	2.0L	1,300	2.7	41L	w194975
w194976	43	68L	860L	10L	24	10	2.0L	600	2.3	35L	w194976
w194977	46	68L	1,300L	10L	29	12	2.0L	2,300	4.5L	45L	w194977
w194978	46	68L	510L	10L	22	9.9	2.0L	270	1.2	19L	w194978
w194979	32	68L	670L	10L	23	9.9	2.0L	770	1.7	25L	w194979
w194980	43	68L	710L	10L	22	9.5	2.0L	1,400	1.6	48L	w194980
w194981	36	68L	680L	10L	22	12	2.0L	1,200	2.7	41L	w194981
w194982	26	68L	670L	10L	25	7.9	2.0L	950	4.8L	48L	w194982
w194983	32	68L	560L	10L	19	7.5	7.0L	650	3.8L	38L	w194983
w194984	78	68L	620L	10L	27	16	2.0L	950	3.2	32L	w194984
w194985	80	68L	730L	10L	32	16	6.0	950	4.0	40L	w194985
w194986	66	68L	670L	10L	38	25	2.0L	940	3.7	37L	w194986
w194987	84	68L	1,500L	10L	32	23	2.0L	1,000	6.5	970	w194987
w194988	94	68L	1,500L	10L	41	22	4.0	1,600	3.1	94L	w194988
w194989	170	68L	920L	10L	52	40	2.0L	680	6.3	63L	w194989
w194990	80	68L	1,100L	10L	35	23	5.0	380	7.0L	70L	w194990
w194991	64	68L	550L	10L	31	31	2.0L	520	4.7	35L	w194991
w194992	110	68L	360L	10L	36	27	2.0L	1,400	3.6	30L	w194992
w194993	110	68L	510L	10L	42	20	8.0	1,000	2.8	28L	w194993
w194994	56	68L	280L	10L	30	14	4.0	740	2.2	27	w194994
w194995	53	68L	190	10L	29	13	4.0	350	1.4	21	w194995
w194996	74	68L	460L	10L	39	21	5.0	1,300	4.2	32L	w194996
w194997	43	68L	180	10L	23	10	3.0	210	1.1	16	w194997
w194998	74	68L	580L	10L	31	25	4.0	1,100	3.8	58L	w194998
w194999	98	68L	440L	10L	38	46	3.0	550	5.7	69	w194999
w195000	94	68L	480L	10L	58	40	4.0	1,800	7.7	46L	w195000
w195001	88	68L	330L	10L	34	19	5.0	620	1.9	29L	w195001
w195002	70	68L	640L	10L	28	41	4.0	1,500	5.1	77L	w195002
w195003	88	68L	220	10L	37	14	5.0	320	1.7	26	w195003
w195004	74	68L	360L	10L	31	18	4.0	910	2.8	42L	w195004
w195009	220	68L	440L	10L	85	18	2.0L	360	4.2	42L	w195009
w195010	220	68L	390L	10L	63	27	8.0	1,100	4.8	48L	w195010
w195011	220	68L	290L	10L	39	21	6.0	690	3.0	30L	w195011
w195012	110	150L	830L	10L	130	45	2.0	2,900	14	100L	w195012
w195013	84	110	580L	10L	44	16	2.0L	1,500	4.4	67L	w195013
w195014	94	68L	390L	10L	36	24	3.0	1,300	4.5	45L	w195014
w195015	84	130	450L	10L	41	19	2.0L	1,500	3.4	52L	w195015
w195016	88	68L	130	10L	30	28	7.0	1,100	3.9	19L	w195016
w195017	110	68L	280L	10L	34	19	5.0	960	3.8	28L	w195017

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Tl-S (ppm)	Tm (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w194974	3.0L	5.0L	12	86	38	4.0	160	130	w194974
w194975	3.0L	5.0L	12	95	29	5.4	120	87	w194975
w194976	3.0L	5.0L	13	83	31	4.7	150	120	w194976
w194977	3.0L	5.0L	12	80	34	4.5	160	72	w194977
w194978	3.0L	5.0L	15	75	25	3.7	280	60	w194978
w194979	3.0L	5.0L	16	110	48	4.1	140	190	w194979
w194980	3.0L	5.0L	14	64	30	3.2	230	58	w194980
w194981	3.0L	5.0L	16	87	35	4.1	160	73	w194981
w194982	3.0L	5.0L	7.9	53	36	4.8	130	57	w194982
w194983	3.0L	5.0L	11	50	24	3.8	150	88	w194983
w194984	3.0L	5.0L	14	150	66	6.4	86	120	w194984
w194985	3.0L	5.0L	16	140	63	8.0	68	130	w194985
w194986	3.0L	5.0L	28	190	93	8.6	74	200	w194986
w194987	24	5.0L	39	130	64	13	92	65	w194987
w194988	3.0L	5.0L	41	240	150	9.4	130	360	w194988
w194989	10L	5.0L	71	330	110	15	68	160	w194989
w194990	24	5.0L	58	170	82	9.3	290	110	w194990
w194991	3.0L	5.0L	19	140	130	13	110	280	w194991
w194992	3.0L	5.0L	24	180	85	10	110	210	w194992
w194993	3.0L	5.0L	12	150	60	5.7	22	220	w194993
w194994	3.0L	5.0L	14	150	45	6.6	39	150	w194994
w194995	3.0L	5.0L	6.7	150	41	4.6	56	140	w194995
w194996	3.0L	5.0L	14	140	46	6.3	90	160	w194996
w194997	3.0L	5.0L	5.3	100	20	4.4	32	70	w194997
w194998	3.0L	5.0L	15	140	67	7.7	64	170	w194998
w194999	3.0L	5.0L	30	100	75	21	140	260	w194999
w195000	3.0L	5.0L	28	320	200	28	71	220	w195000
w195001	4.0	5.0L	13	150	62	7.6	54	150	w195001
w195002	3.0L	5.0L	23	160	84	13	46	69	w195002
w195003	3.0L	5.0L	12	190	60	9.1	200	88	w195003
w195004	3.0L	5.0L	15	150	110	13	210	230	w195004
w195009	3.0L	5.0L	28	190	130	24	910	68	w195009
w195010	3.0L	5.0L	37	240	170	23	820	420	w195010
w195011	20	5.0L	19	260	87	9.9	270	200	w195011
w195012	3.0L	10	66	290	370	69	87	77	w195012
w195013	3.0L	5.0L	29	160	110	13	290	95	w195013
w195014	3.0L	5.0L	22	210	140	13	110	480	w195014
w195015	3.2L	5.0L	17	110	120	10	110	160	w195015
w195016	3.0L	5.0L	7.8	150	140	10	310	390	w195016
w195017	3.0L	5.0L	26	210	85	11	88	110	w195017

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w195018	11.6	56	34	1.1	0.50	0.35	1.7	2.3	1.5	0.04	w195018
w195019	6.6	63	23	1.6	.45	.61	1.3	4.1	2.1	.02	w195019
w195020	3.9	21	15	16	.65	.35	.96	22	1.0	.11	w195020
w195034	4.2	45	27	2.2	.58	.64	1.5	11	1.9	.10	w195034
w195035	10.6	54	27	.79	.88	.25	4.0	5.0	1.2	.02	w195035
w195036	1.7	41	28	5.4	1.1	1.6	1.4	4.9	1.7	.08	w195036
w195037	3.2	52	27	3.1	.83	.42	.45	4.0	2.4	.04	w195037
w195038	4.3	47	36	2.0	.53	.31	1.6	3.7	1.6	.01	w195038
w195039	4.8	47	28	1.5	.80	.84	3.1	8.2	1.4	.06	w195039
w195040	14.3	59	28	.74	.41	.28	1.5	2.7	2.2	.06	w195040
w195041	7.9	56	29	.44	.55	.17	3.3	1.8	2.7	.04	w195041
w195042	11.4	59	29	.84	.50	.24	1.7	2.2	1.8	.03	w195042
w195043	6.6	56	29	1.4	.63	.41	1.1	3.7	2.0	.03	w195043
w195044	13.2	45	26	1.4	.41	.31	.95	16	1.8	.02	w195044
w195045	9.8	56	27	3.6	.50	.14	.69	2.7	2.8	.03	w195045
w195046	7.8	47	32	1.1	.71	.35	2.9	6.6	1.3	.04	w195046
w195047	5.6	51	31	.92	.78	.48	4.0	3.2	1.4	.05	w195047
w195048	2.4	37	23	1.6	.50	1.7	1.6	20	1.1	.03	w195048
w195049	9.5	48	37	.56	1.2	.28	2.2	4.7	.91	.22	w195049
w195050	14.6	67	25	.39	.35	.28	1.7	1.7	2.9	.07	w195050
w195051	8.7	49	26	.74	.68	.46	2.8	12	1.2	.03	w195051
w195052	6.7	55	31	1.6	.60	.20	1.3	3.4	1.8	.05	w195052
w195053	14.9	32	14	1.3	.68	.18	2.0	36	.79	.05	w195053
w195054	3.6	43	27	3.2	.96	.75	1.8	6.7	1.3	.07	w195054
w195055	2.2	40	28	4.1	.96	.61	1.9	8.6	1.1	.07	w195055
w195056	8.7	43	23	1.3	.48	.31	1.5	21	1.3	.01	w195056
w195057	9.9	53	28	1.1	.51	.27	2.1	6.8	1.7	.02	w195057
w195058	4.4	49	28	6.6	.65	.61	1.6	3.8	1.4	.03	w195058
w195059	8.7	55	31	.90	.70	.31	2.3	3.0	2.3	.05	w195059
w195060	6.3	54	31	1.1	.70	.43	1.7	4.9	1.8	.04	w195060
w195061	7.7	65	25	.82	.38	.35	1.7	2.6	1.9	.01	w195061
w195062	12.5	60	26	.69	.58	.32	1.5	4.3	2.1	.05	w195062
w195063	11.6	48	35	.78	.78	.23	3.9	4.7	1.1	.03	w195063
w195064	15.9	51	29	.50	.65	.17	2.8	8.8	1.5	.04	w195064
w195066	3.0	48	27	2.9	.70	1.8	1.9	4.9	1.5	.04	w195066
w195067	10.1	48	29	1.6	1.0	.53	4.1	6.0	1.5	.02	w195067
w195068	7.3	49	27	2.0	.61	.55	1.7	8.9	1.6	.06	w195068
w195005	14.0	56	30	.43	.53	.39	2.5	2.9	2.1	.05	w195005
w195006	9.2	50	32	.97	.73	.59	3.4	3.5	1.3	.06	w195006
w195007	4.3	44	37	1.7	.41	.63	.91	6.9	1.7	.08	w195007

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	SO3 (percent)	Ag-S (ppm)	Au-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Bi-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Sample number
w195018	1.2	0.20	10L	200	580	17	15L	1.0	260	26	w195018
w195019	1.7	.60	10L	270	520	88	15L	.27	230	39	w195019
w195020	14	.40	10L	180	930	160	15L	.65	150	120	w195020
w195034	3.3	1.3	10L	1,200	630	46	15L	.87	210	110	w195034
w195035	.90	.30	10L	280	670	33	15L	.23	110	54	w195035
w195036	9.2	1.0	10L	300	1,900	120	15L	.94	290	260	w195036
w195037	4.3	.80	10L	690	510	140	15L	.67	250	170	w195037
w195038	2.6	1.0	10L	170	720	66	15L	.38	300	150	w195038
w195039	2.2	.50	10L	230	1,300	21	15L	.78	230	100	w195039
w195040	.85	.50	10L	190	410	12	15L	.58	200	61	w195040
w195041	.44	.30	10L	140	490	18	15L	.38	190	46	w195041
w195042	1.0	.40	10L	93	2,500	61	15L	.42	110	160	w195042
w195043	1.5	.50	10L	160	1,300	12	15L	.48	210	64	w195043
w195044	1.5	.50	10L	71	440	39	15L	1.2	200	40	w195044
w195045	3.0	.10	10L	190	520	20	15L	.58	220	73	w195045
w195046	1.2	.40	10L	310	540	23	15L	1.3	190	59	w195046
w195047	1.9	.50	10L	99	3,000G	220	15L	.42	200	410	w195047
w195048	2.5	.80	10L	170	1,200	90	15L	1.9	170	180	w195048
w195049	.46	.40	10L	76	1,000	52	15L	1.3	280	99	w195049
w195050	.27	.10L	10L	96	780	9.0	15L	.32	230	23	w195050
w195051	1.1	1.0	10L	130	870	11	15L	.38	150	43	w195051
w195052	1.9	.60	10L	500	770	51	15L	.57	210	36	w195052
w195053	2.6	.20	10L	220	270	39	15L	.27	100	13	w195053
w195054	6.0	1.3	10L	260	3,000G	150	15L	.65	190	150	w195054
w195055	6.4	.70	10L	1,000	1,000	56	15L	.83	180	190	w195055
w195056	1.6	.60	10L	130	420	37	15L	.42	130	59	w195056
w195057	1.6	.40	10L	140	900	43	15L	.47	160	62	w195057
w195058	5.2	.30	10L	210	700	65	15L	1.1	200	100	w195058
w195059	1.1	.50	10L	130	2,100	39	15L	.67	210	60	w195059
w195060	1.3	.50	10L	200	970	26	15L	.42	210	60	w195060
w195061	.83	.40	10L	180	470	50	15L	.42	190	60	w195061
w195062	.82	.40	10L	140	420	17	15L	.82	140	71	w195062
w195063	1.2	.60	10L	120	620	20	15L	1.7	170	210	w195063
w195064	.66	.50	10L	140	430	11	15L	.67	170	45	w195064
w195066	4.0	.70	10L	300	3,200	170	15L	.65	200	210	w195066
w195067	2.3	.50	10L	210	810	43	15L	.57	170	88	w195067
w195068	3.2	.50	10L	190	910	37	15L	.42	150	67	w195068
w195005	.33	.20	10L	210	360	19	15L	.69	170	59	w195005
w195006	1.0	.60	10L	400	520	38	15L	.38	130	150	w195006
w195007	1.8	.60	10L	1,200	290	40	15L	.65	280	240	w195007

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Cr (ppm)	Cs (ppm)	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Sample number
w195018	130	6.0	100	30	16	3.3	83	24	10	18	w195018
w195019	110	4.5	110	35	19	4.2	62	24	29	11	w195019
w195020	110	5.1	300	31	10L	4.4	170	32	55	5.1	w195020
w195034	170	4.8	400	22L	10L	4.8	110	14	73	9.5	w195034
w195035	130	16	110	22L	13	4.0	120	17	46	5.7	w195035
w195036	160	29L	460	26	16	7.6	100	23	21	5.9	w195036
w195037	180	16L	370	22L	12	5.9	64	16	19	13	w195037
w195038	190	7.0	420	22L	11	5.6	80	18	49	9.3	w195038
w195039	180	8.3	270	22L	10L	6.5	68	12	15	6.3	w195039
w195040	200	7.0	160	22L	10L	3.5	44	12	2.0	13	w195040
w195041	170	6.3	180	22L	10L	3.0	69	11	4.0	10	w195041
w195042	240	6.1	230	22L	12	3.9	150	16	110	8.8	w195042
w195043	150	6.1	210	22L	10L	3.6	53	15	3.0	14	w195043
w195044	150	3.8	340	22L	10L	3.2	50	7.0L	6.0	9.1	w195044
w195045	190	2.0	160	22L	11	3.0	59	16	8.0	13	w195045
w195046	150	14	190	22L	10L	3.7	66	15	13	6.4	w195046
w195047	170	13	370	34	23	6.3	180	26	120	7.1	w195047
w195048	110	4.2	380	27	15	5.8	100	20	120	4.2	w195048
w195049	170	9.5	250	23	10L	6.3	110	12	40	7.4	w195049
w195050	160	5.5	170	22L	10L	3.4	50	14	2.0L	15	w195050
w195051	120	11	120	22L	10L	3.0	50	7.0L	2.0	5.7	w195051
w195052	200	4.5	290	22L	15	4.8	62	22	93	9.0	w195052
w195053	74	6.7	120	22L	10L	1.9	65	7.0L	13	4.0	w195053
w195054	130	8.3	270	22L	16	4.4	130	18	22	8.3	w195054
w195055	130	14	310	22L	13	6.4	99	23	39	4.5	w195055
w195056	100	9.2	140	22L	10L	2.3	43	13	3.0	6.9	w195056
w195057	140	13	140	22L	10L	3.1	66	12	19	8.1	w195057
w195058	130	6.8	300	25	17	5.0	50	22	15	6.8	w195058
w195059	180	6.9	250	22L	10L	3.8	77	12	40	10	w195059
w195060	160	9.5	170	22L	10L	3.2	56	11	14	9.5	w195060
w195061	140	5.2	150	22L	10L	3.9	44	15	7.0	7.8	w195061
w195062	150	4.0	170	22L	10L	2.6	49	12	3.0	9.6	w195062
w195063	170	19	280	22L	10L	3.3	34	10	6.0	5.2	w195063
w195064	130	11	170	22L	10L	3.0	51	10	2.0L	6.3	w195064
w195066	180	6.7	100	34	21	5.3	140	24	52	6.7	w195066
w195067	140	9.9	200	22L	10L	4.1	110	12	30	5.9	w195067
w195068	120	6.8	170	22L	10	2.5	50	15	13	8.2	w195068
w195005	180	10	160	22L	10L	3.1	38	10	3.0	8.6	w195005
w195006	250	8.7	260	24	19	3.6	100	12	36	6.5	w195006
w195007	230	4.7L	390	25	13	7.7	45	15	7.0	9.3	w195007

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Ho-S (ppm)	In-S (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Sample number
w195018	7.0L	7.0L	150	160	3	44	6.0	29	130	44	w195018
w195019	9.0	7.0L	140	98	3	58	7.0	40	140	100	w195019
w195020	68L	7.0L	77	130	3	140	10	18	120	150	w195020
w195034	7.0L	7.0L	120	210	2	85	20	17	110	310	w195034
w195035	7.0L	7.0L	57	140	3	77	7.0	12	73	160	w195035
w195036	7.0L	7.0L	120	170	6	200	14	12	98	380	w195036
w195037	7.0L	7.0L	120	120	3	59	11	30	46L	340	w195037
w195038	7.0L	7.0L	160	290	2	61	3.0	17	130	220	w195038
w195039	7.0L	7.0L	100	160	2	65	13	11	74	150	w195039
w195040	7.0L	7.0L	110	170	2	30	16	15	69	120	w195040
w195041	7.0L	7.0L	100	120	1	42	9.0	37	73	100	w195041
w195042	7.0L	7.0L	53	230	3	35	3.0	29	89	350	w195042
w195043	7.0L	7.0L	120	210	2	38	6.0	26	93	220	w195043
w195044	7.0L	7.0L	110	190	2	200	38	23	91	85	w195044
w195045	7.0L	7.0L	130	100	1	290	15	35	62	120	w195045
w195046	7.0L	7.0L	120	160	1	62	29	7	95	120	w195046
w195047	9.0	7.0L	89	140	4	77	21	15	140	570	w195047
w195048	10	7.0L	83	120	4	210	25	13	110	550	w195048
w195049	7.0L	13	150	270	3	43	15	6	80	170	w195049
w195050	7.0L	7.0L	130	140	2	22	5.0	39	120	94	w195050
w195051	7.0L	7.0L	80	120	1	73	10	10	46L	63	w195051
w195052	7.0L	7.0L	100	220	3	44	3.0	37	120	65	w195052
w195053	7.0L	7.0L	60	83	1	1,200	16	5	46L	38	w195053
w195054	7.0L	7.0L	110	160	3	120	9.0	15	94	260	w195054
w195055	7.0L	7.0L	91	180	5	150	41	8	64	340	w195055
w195056	7.0L	7.0L	69	130	1	89	8.0	6	46L	89	w195056
w195057	7.0L	7.0L	91	140	1	43	2.0L	19	65	140	w195057
w195058	7.0	7.0L	91	160	2	210	5.0	23	100	240	w195058
w195059	7.0L	7.0L	140	200	1L	47	8.0	21	100	110	w195059
w195060	7.0L	7.0L	110	160	2	45	6.0	26	81	110	w195060
w195061	7.0L	7.0L	100	84	1	20	7.0	27	110	190	w195061
w195062	7.0L	7.0L	80	190	2	50	6.0	31	83	150	w195062
w195063	7.0L	7.0L	95	160	2	37	28	10	53	140	w195063
w195064	7.0L	7.0L	94	150	1	57	12	17	83	110	w195064
w195066	9.0	7.0L	300	110	7	32	19	36	90	310	w195066
w195067	7.0L	7.0L	89	190	2	93	14	6	87	190	w195067
w195068	7.0L	7.0L	82	180	1	150	13	27	110	150	w195068
w195005	7.0L	7.0L	110	140	2	46	7.0	16	60	78	w195005
w195006	7.0L	7.0L	87	160	4	48	11	12	64	220	w195006
w195007	7.0L	7.0L	160	280	2	59	31	15	85	280	w195007

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Re-S (ppm)	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Sample number
w195018	130	68L	250L	10L	36	32	17	610	5.2	52	w195018
w195019	110	68L	380L	10L	35	26	11	1,200	6.1	45L	w195019
w195020	80	68L	720L	10L	28	21	4.0	3,900	5.1	77L	w195020
w195034	98	68L	740L	10L	45	21	3.0	1,500	2.4	71L	w195034
w195035	74	68L	300	10L	50	16	2.0L	620	3.8	28L	w195035
w195036	100	68L	1,500L	10L	47	35	11	3,600	5.9	180L	w195036
w195037	130	68L	750L	10L	41	22	11	1,700	3.1	94L	w195037
w195038	160	68L	650L	10L	53	28	8.0	1,800	4.7	70L	w195038
w195039	140	68L	690L	10L	50	27	14	1,500	6.3	63L	w195039
w195040	78	68L	180	10L	44	18	6.0	640	2.8	91	w195040
w195041	100	68L	380L	10L	34	18	9.0	430	2.5	38L	w195041
w195042	130	68L	290L	10L	57	18	8.0	970	4.4	26L	w195042
w195043	88	68L	560L	10L	38	20	13	1,700	3.0	45L	w195043
w195044	110	68L	310L	10L	40	16	2.0L	1,000	2.3	23L	w195044
w195045	110	68L	350L	10L	38	15	10L	700	2.0	31L	w195045
w195046	88	68L	470L	10L	36	19	3.0	650	2.6	38L	w195046
w195047	98	68L	660L	10L	57	27	9.0	1,200	7.1	54L	w195047
w195048	91	76	1,500L	10L	50	25	2.0L	1,800	4.2	130L	w195048
w195049	130	68L	430L	10L	58	28	7.0	1,100	5.3	32L	w195049
w195050	94	68L	320L	10L	37	17	9.0	620	2.1	41	w195050
w195051	53	68L	440L	10L	30	14	2.0L	700	2.3	34L	w195051
w195052	98	68L	450L	10L	52	22	8.0	1,100	4.5	45L	w195052
w195053	43	68L	260L	10L	21	9.4	2.0L	440	1.3	20L	w195053
w195054	74	68L	830L	10L	50	22	2.0	2,900	2.8	83L	w195054
w195055	100	68L	1,200L	10L	59	27	2.0	3,200L	4.5	140L	w195055
w195056	46	68L	380L	10L	26	13	2.0L	760	1.1	34L	w195056
w195057	60	68L	350L	10L	30	13	2.0L	1,200	2.0	30L	w195057
w195058	78	68L	590L	10L	39	23	8.0	1,800	4.5	68L	w195058
w195059	120	68L	360L	10L	47	22	11	820	3.4	34L	w195059
w195060	88	68L	480L	10L	35	17	4.0	1,500	3.2	48L	w195060
w195061	84	68L	350L	10L	43	19	9.0	990	2.6	39L	w195061
w195062	94	68L	260L	10L	34	13	4.0	830	2.4	24L	w195062
w195063	110	68L	300	10L	43	16	3.0	590	2.6	26L	w195063
w195064	80	68L	200	10L	31	15	2.0L	380	1.9	19L	w195064
w195066	67	68L	1,100L	10L	63	63	3.0	4,000	6.7	100L	w195066
w195067	84	68L	270	10L	41	20	5.0	1,400	3.0	30L	w195067
w195068	70	68L	360L	10L	30	14	2.0L	2,900	1.4	41L	w195068
w195005	91	68L	140	10L	39	19	6.0	240	2.1	21L	w195005
w195006	200	68L	360L	10L	96	18	5.0	540	4.3	33L	w195006
w195007	160	68L	560L	10L	47	40	12	860	7.0	70L	w195007

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Tl-S (ppm)	Tm (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w195018	3.0L	5.0L	32	220	140	14	140	590	w195018
w195019	3.0L	5.0L	23	160	200	17	64	410	w195019
w195020	3.0L	5.0L	21	100	210	18	62	280	w195020
w195034	3.0L	5.0L	26	250	88	9.5	170	110	w195034
w195035	3.0L	5.0L	20	220	130	15	78	100	w195035
w195036	3.0L	5.0L	29	190	150	18	77	130	w195036
w195037	3.0L	5.0L	25	200	110	16	72	210	w195037
w195038	3.0L	5.0L	30	270	110	9.3	170	160	w195038
w195039	3.0L	5.0L	40	250	55	15	120	63	w195039
w195040	5.0	5.0L	20	200	54	9.1	30	120	w195040
w195041	3.0L	5.0L	13	260	50	8.9	69	210	w195041
w195042	3.0L	5.0L	24	440	110	13	87	180	w195042
w195043	3.0L	5.0L	20	150	70	11	37	220	w195043
w195044	3.0L	5.0L	21	180	66	8.3	64	140	w195044
w195045	3.0L	5.0L	15	160	82	9.2	37	360	w195045
w195046	17	5.0L	14	240	80	10	220	94	w195046
w195047	3.0L	5.0L	21	300	230	25	130	150	w195047
w195048	3.0L	5.0L	38	240	140	17	280	130	w195048
w195049	3.0L	5.0L	29	330	89	18	260	62	w195049
w195050	3.0L	5.0L	20	200	78	11	52	420	w195050
w195051	15	5.0L	15	150	28	6.9	90	66	w195051
w195052	3.0L	5.0L	31	310	170	16	100	310	w195052
w195053	3.0L	5.0L	9.4	92	48	6.0	46	68	w195053
w195054	3.0L	5.0L	19	240	160	17	76	270	w195054
w195055	3.0L	5.0L	36	190	150	23	160	110	w195055
w195056	3.0L	5.0L	11	110	30	6.9	57	53	w195056
w195057	3.0L	5.0L	12	170	51	7.1	56	98	w195057
w195058	3.0L	5.0L	27	230	170	16	90	220	w195058
w195059	3.0L	5.0L	25	230	83	16	160	130	w195059
w195060	3.0L	5.0L	16	210	66	7.9	32	160	w195060
w195061	3.0L	5.0L	17	230	95	10	22	200	w195061
w195062	3.0L	5.0L	16	210	80	8.0	160	200	w195062
w195063	3.0L	5.0L	23	170	75	9.5	300	200	w195063
w195064	33	5.0L	19	230	57	6.9	64	110	w195064
w195066	3.0L	5.0L	23	250	240	37	68	590	w195066
w195067	3.0L	5.0L	19	250	65	12	350	69	w195067
w195068	3.0L	5.0L	18	230	89	6.8	43	270	w195068
w195005	3.0L	5.0L	16	170	71	11	32	160	w195005
w195006	3.0L	5.0L	30	370	150	27	66	170	w195006
w195007	3.0L	5.0L	28	250	130	21	85	110	w195007

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w195008	18.8	60	17	4.8	0.35	0.29	3.0	1.6	1.1	0.56	w195008
w195033	6.9	45	30	1.8	1.1	.39	4.1	7.0	.96	.09	w195033
w195021	3.4	45	26	2.6	.63	1.2	1.0	12	1.8	.13	w195021
w195022	9.3	48	37	1.2	.98	.43	3.6	4.8	1.3	.07	w195022
w195023	7.2	54	33	1.3	.56	.37	.87	2.8	2.1	.05	w195023
w195024	4.6	57	31	1.2	.71	.59	1.9	3.0	2.2	.02	w195024
w195025	7.1	46	34	1.8	.91	.57	2.5	4.8	1.0	1.4	w195025
w195026	5.2	44	25	1.8	1.4	1.0	3.6	10	.98	.12	w195026
w195027	6.0	45	36	1.9	.80	.90	2.1	4.8	.99	.78	w195027
w195028	4.3	44	26	2.8	1.2	1.3	2.9	9.7	1.0	.29	w195028
w195029	6.1	55	28	2.1	.66	.88	1.5	3.1	2.0	.04	w195029
w195030	6.4	64	22	1.5	.36	.21	.60	2.7	2.8	.02	w195030
w195031	4.5	50	36	1.6	.48	.30	1.6	2.6	1.1	.07	w195031
w195032	11.3	57	29	.85	.46	.24	1.4	2.7	2.0	.04	w195032

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	SO3 (percent)	Ag-S (ppm)	Au-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Bi-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Sample number
w195008	0.46	0.20	10L	170	430	8.0	15L	0.42	160	19	w195008
w195033	2.7	.60	10L	700	730	30	15L	.97	200	200	w195033
w195021	3.2	.70	10L	330	770	100	15L	1.3	240	140	w195021
w195022	1.3	.80	10L	160	750	34	15L	.97	200	150	w195022
w195023	1.2	.30	10L	180	410	27	15L	.33	220	71	w195023
w195024	1.2	1.0	10L	130	660	52	15L	.57	240	180	w195024
w195025	1.4	.90	10L	190	1,600	34	15L	1.4	390	70	w195025
w195026	2.7	1.2	10L	210	1,200	38	15L	1.0	190	130	w195026
w195027	1.8	1.0	10L	250	1,400	33	15L	.94	330	100	w195027
w195028	3.9	1.0	10L	240	1,200	41	15L	1.5	210	120	w195028
w195029	2.8	.50	10L	190	1,200	24	15L	.67	200	56	w195029
w195030	1.8	.70	10L	400	990	130	15L	.43	230	130	w195030
w195031	1.7	1.0	10L	970	400	64	15L	.82	200	430	w195031
w195032	.70	.30	10L	310	350	11	15L	.38	160	42	w195032

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Cr (ppm)	Cs (ppm)	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Sample number
w195008	200	5.3	180	22L	10L	2.5	24	10	2.0L	12	w195008
w195033	170	12	220	22L	10L	4.1	72	15	14	5.8	w195033
w195021	180	2.9	410	39	21	5.0	120	28	37	8.8	w195021
w195022	190	8.6	360	22L	14	5.3	110	23	6.0	5.4	w195022
w195023	170	2.8	200	22L	14	3.8	50	20	8.0	11	w195023
w195024	190	6.5	320	22L	12	3.7	100	16	60	11	w195024
w195025	150	11	430	32	15	6.3	80	23	13	4.2	w195025
w195026	170	17	290	22L	12	4.2	120	16	190	3.8	w195026
w195027	150	10	690	36	17	5.5	89	22	10	5.0	w195027
w195028	170	16	230	28	12	4.9	130	21	220	4.7	w195028
w195029	160	6.6	190	22L	11	3.4	54	13	3.0	9.8	w195029
w195030	170	3.1	230	22L	13	4.1	84	14	38	16	w195030
w195031	220	4.4	310	32	20	7.6	110	27	26	6.7	w195031
w195032	160	4.4	100	22L	10L	2.9	43	11	2.0	8.0	w195032

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Ho-S (ppm)	In-S (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Sample number
w195008	7.0L	7.0L	110	220	2	31	3.0	35	53	43	w195008
w195033	7.0L	7.0L	100	160	3	130	47	7	110	180	w195033
w195021	10	7.0L	120	180	3	64	26	43	120	260	w195021
w195022	7.0L	7.0L	97	260	2	60	14	15	130	260	w195022
w195023	7.0L	7.0L	120	220	1	40	8.0	56	140	130	w195023
w195024	7.0L	7.0L	130	130	2	63	5.0	36	140	370	w195024
w195025	7.0L	7.0L	210	200	3	64	32	12	230	110	w195025
w195026	7.0L	7.0L	96	150	2	120	26	14	80	250	w195026
w195027	7.0L	7.0L	170	270	2	57	42	12	150	270	w195027
w195028	7.0	7.0L	93	150	2	120	52	24	92	230	w195028
w195029	7.0L	7.0L	110	130	2	87	8.0	25	99	140	w195029
w195030	7.0L	7.0L	120	150	2	90	21	63	140	400	w195030
w195031	8.0	7.0L	89	200	4	59	34	10	140	410	w195031
w195032	7.0L	7.0L	88	210	.9	46	7.0	26	100	140	w195032

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Re-S (ppm)	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Sample number
w195008	98	68L	130	10L	35	14	4.0	960	2.1	32	w195008
w195033	98	68L	250	10L	55	22	3.0	1,100	4.3	43L	w195033
w195021	98	150L	970L	10L	47	24	2.0	3,400	5.9	88L	w195021
w195022	160	150L	440L	10L	47	26	7.0	1,300	4.3	32L	w195022
w195023	120	68L	460L	10L	38	19	9.0	1,400	4.2	42L	w195023
w195024	150	68L	720L	10L	39	20	13	1,500	2.2	65L	w195024
w195025	91	69	690L	10L	41	35	6.0	6,000	4.2	42L	w195025
w195026	110	68L	830L	10L	56	19	2.0	4,100	3.8	58L	w195026
w195027	120	68L	730L	10L	67	30	4.0	4,400	5.0	50L	w195027
w195028	98	68L	910L	10L	65	23	2.0	4,200	4.7	140	w195028
w195029	100	68L	640L	10L	36	16	11	2,000	3.3	49L	w195029
w195030	100	68L	470L	10L	39	19	12	1,200	3.1	47L	w195030
w195031	110	68L	670L	10L	73	33	7.0	990	6.7	67L	w195031
w195032	80	68L	290L	10L	35	13	7.0	800	1.8	27L	w195032

Table 8f.--Major and minor oxide and trace element compostion of the laboratory ash of 254 bituminous coal samples from West Virginia--continued

Sample number	Tl-S (ppm)	Tm (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w195008	3.0L	5.0L	14	140	54	8.0	34	370	w195008
w195033	3.0L	5.0L	25	300	85	13	170	71	w195033
w195021	33	5.0L	32	230	240	18	88	490	w195021
w195022	3.0L	5.0L	29	400	130	12	120	130	w195022
w195023	3.0L	5.0L	18	240	160	9.7	46	800	w195023
w195024	3.0L	5.0L	20	250	150	13	140	300	w195024
w195025	3.0L	5.0L	28	410	140	11	190	120	w195025
w195026	13	5.0L	33	380	97	12	410	98	w195026
w195027	6.0	5.0L	28	460	140	12	120	140	w195027
w195028	3.0L	5.0L	33	460	120	12	650	160	w195028
w195029	3.0L	5.0L	20	250	97	8.2	50	230	w195029
w195030	3.0L	5.0L	16	220	120	11	71	590	w195030
w195031	3.0L	5.0L	33	350	210	24	220	190	w195031
w195032	3.0L	5.0L	9.7	170	62	6.2	30	170	w195032

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia.

[Analysis performed on whole-coal. Values in parts-per-million (ppm). L, less than the value shown; B, not determined.]

Sample number	As (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	La (ppm)	Sample number
w193726	2.0	24	6.3	12	0.8	0.40	300	0.7	0.030	12	w193726
w193727	2.0	9.0	11	4.2	.1	.18	68	.3	.17	5	w193727
w193728	6.0	14	15	6.4	.3L	.27	20L	.3	.090	9	w193728
w193729	5.0	54	13	53	4.8	.92	20L	2.4	.13	28	w193729
w193941	11	25	4.8	13	.3	.51	170	.7	.10	14	w193941
w193942	41	40	6.7	13	.6	.85	42	.7	.38	19	w193942
w193943	88	20	5.6	12	.2	.46	30	1.0	.14	9	w193943
w193944	7.0	11	2.6	3.2	.5L	.14	20L	.3	.010L	9	w193944
w193951	2.0	9.0	5.1	11	.2	.20	38	.5	.010L	6	w193951
w193952	5.0	11	22	9.6	.6	.32	51	.3	.090	5	w193952
w193953	4.0	10	12	6.2	1.3	.32	50	.2	.010	4	w193953
w193954	1.0	9.0	7.0	7.1	.1	.18	20L	.5	.010L	5	w193954
w193955	4.0	26	3.5	23	1.4	.41	69	1.3	.070	14	w193955
w193956	1.0	35	9.0	30	3.0	.60	130	1.6	.010L	19	w193956
w193957	3.0	29	7.4	24	3.1	.48	150	1.2	.030	15	w193957
w193958	36	15	8.6	9.0	.9	.25	37	.5	.10	9	w193958
w193959	69	19	4.1	11	2.2	.29	72	.4	.21	12	w193959
w193960	8.0	14	8.4	6.7	.4	.21	30	.4	.050	8	w193960
w193961	15	19	6.1	10	.4	.31	34	.8	.050	11	w193961
w193962	3.0	14	2.1	8.7	.6	.25	37	.6	.020	8	w193962
w193963	1.0	17	11	9.9	.3	.29	31	.6	.010L	9	w193963
w193964	13	20	5.3	12	1.0	.38	40	.5	.030	11	w193964
w193965	5.0	13	6.6	7.4	.2	.25	20	.4	.080	7	w193965
w193966	18	30	4.4	18	2.4	.51	84	.9	.060	16	w193966
w193967	40	15	6.0	15	1.7	.29	57	.4	.090	8	w193967
w193968	6.0	11	6.7	9.2	.3	.22	35	.4	.040	6	w193968
w193969	15	19	7.1	17	1.5	.34	84	.8	.060	10	w193969
w193970	12	21	6.9	14	.2	.28	27	1.0	.050	12	w193970
w193971	6.0	9.0	4.0	5.5	.3	.14	27	.4	.020	6	w193971
w193972	2.0	23	11	15	.1	.31	27	1.1	.010L	15	w193972
w193973	1.0	15	10	8.5	.1	.23	26	.7	.020	9	w193973
w193974	70	14	12	7.9	.4	.58	38	.4	.31	6	w193974
w193975	1.0	25	7.9	15	.8L	.36	20L	1.2	.020	15	w193975
w193976	4.0	14	9.2	6.1	.9L	.21	20L	.5	.030	8	w193976
w193977	1.0	9.0	9.5	4.4	.1	.21	21	.2	.010L	5	w193977
w193978	6.0	8.0	7.8	5.3	.1	.20	20L	.2	.010L	4	w193978
w193979	1.0L	9.0	11	4.1	.1	.24	20L	.2	.010L	5	w193979
w193980	25	19	12	12	1.1	.34	91	.4	.10	10	w193980
w193981	2.0	9.0	8.1	5.4	.6L	.22	20L	.2	.010L	5	w193981
w193982	2.0	22	4.4	12	.2	.33	20L	.9	.010	13	w193982

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Th (ppm)	Sample number
w193726	0.1	230	140	14	0.30	2.6	1.9	2.2	0.3	9.0	w193726
w193727	.1	240	20	13L	.10	1.0	1.5	.90	.1	3.0L	w193727
w193728	.1	93	8	13L	1.0	1.2	2.0	1.4	.2	3.0L	w193728
w193729	.5	90	7	79	1.0	12	7.3	5.5	.8	3.0L	w193729
w193941	.2	270	810	17L	1.7	3.0	3.7	2.6	.4	3.0L	w193941
w193942	.3	300	74	21L	2.0	3.6	6.0	4.2	.7	3.0L	w193942
w193943	.2	160	120	15L	1.5	3.0	4.8	2.1	.3	3.0L	w193943
w193944	.1L	310	39	17L	.10	.80	1.5	.80	.1	3.0L	w193944
w193951	.1	150	76	11L	1.1	2.8	2.0	.90	.2	7.0	w193951
w193952	.2	160	33	11L	1.0	2.5	4.7	1.5	.3	3.0L	w193952
w193953	.2	210	32	10L	3.6	3.1	1.9	1.3	.3	3.0L	w193953
w193954	.1	330	4	11L	.70	1.6	2.1	.90	.2	3.0L	w193954
w193955	.2	210	32	5	.50	4.8	6.6	2.1	.3	3.0L	w193955
w193956	.2	370	10	10	.40	5.9	4.3	2.9	.4	3.0L	w193956
w193957	.2	500	40	9	.90	5.3	3.7	2.4	.3	26	w193957
w193958	.1	690	B	71L	1.3	1.8	2.1	1.2	.2	3.0L	w193958
w193959	.1	280	16	49L	2.8	2.3	3.1	1.6	.2	3.0L	w193959
w193960	.1	700	7	51L	.50	1.5	1.6	1.1	.2	3.0L	w193960
w193961	.1	230	8	37L	.60	2.3	2.3	1.6	.3	3.0L	w193961
w193962	.1	220	13	35L	.40	1.9	1.8	1.3	.2	3.0L	w193962
w193963	.1	210	7	37L	.20	2.1	1.6	1.4	.2	3.0L	w193963
w193964	.2	210	13	40L	.60	2.7	3.3	2.0	.3	3.0L	w193964
w193965	.1	150	4	32L	.50	1.6	2.2	1.2	.2	3.0L	w193965
w193966	.2	320	22	44L	.80	4.5	6.4	2.8	.4	3.0L	w193966
w193967	.1	390	14	46L	1.1	2.7	2.4	1.5	.2	6.0	w193967
w193968	.1	390	38	43L	.60	2.1	2.4	1.1	.2	3.0L	w193968
w193969	.1	830	31	54L	.80	3.4	2.1	1.7	.3	3.0L	w193969
w193970	.1	460	50	39L	.40	2.7	1.7	1.6	.3	3.0L	w193970
w193971	.1	310	16	31L	.20	1.3	1.1	.70	.1	3.0L	w193971
w193972	.1	530	56	43L	.30	2.9	1.9	1.7	.3	3.0L	w193972
w193973	.1	400	12	39L	.50	2.2	2.3	1.2	.3	3.0L	w193973
w193974	.2	210	23	36L	3.1	2.1	2.6	3.1	.4	3.0L	w193974
w193975	.1	350	45	38L	.50	3.4	3.9	1.9	.3	3.0L	w193975
w193976	.1	500	42	42L	.40	1.7	2.7	1.1	.2	3.0L	w193976
w193977	.1	240	20	32L	.50	1.3	.8	1.1	.2	3.0L	w193977
w193978	.1	290	15	32L	.80	1.4	1.3	1.0	.2	3.0L	w193978
w193979	.1	250	21	30L	.20	1.2	.6	1.2	.2	3.0L	w193979
w193980	.1	390	52	B	1.4	2.7	2.1	1.8	.2	3.0L	w193980
w193981	.1	200	6	B	.20	1.7	1.3	1.0	.2	3.0L	w193981
w193982	.1	510	12	B	.50	2.8	2.6	1.6	.3	3.0L	w193982

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	U (ppm)	Yb (ppm)
w193726	3.0	0.8
w193727	1.0	.3
w193728	.40	.4
w193729	.30	2.4
w193941	2.5	1.1
w193942	3.2	2.0
w193943	1.2	1.0
w193944	.30	.2
w193951	1.9	.7
w193952	1.4	1.0
w193953	2.2	1.4
w193954	1.7	.6
w193955	2.2	.9
w193956	1.9	1.2
w193957	1.8	1.2
w193958	1.8	.5
w193959	2.6	.6
w193960	1.3	.4
w193961	1.9	.6
w193962	1.8	.5
w193963	1.3	.6
w193964	1.9	.9
w193965	1.3	.7
w193966	2.2	1.2
w193967	1.4	.7
w193968	1.8	.5
w193969	2.1	.8
w193970	1.5	.7
w193971	.90	.3
w193972	1.5	.7
w193973	1.4	.6
w193974	1.9	1.0
w193975	1.8	.8
w193976	1.4	.4
w193977	1.0	.5
w193978	1.2	.4
w193979	.80	.5
w193980	3.2	.7
w193981	1.1	.5
w193982	1.7	.7

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	As (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	La (ppm)	Sample number
w193983	4.0	12	9.5	7.2	0.2	0.19	20L	0.5	0.040	7	w193983
w193984	4.0	17	8.7	10	.2	.25	20L	.7	.040	10	w193984
w193985	6.0	15	2.8	7.4	.1	.22	21	.5	.070	9	w193985
w193986	2.0	15	17	10	.2	.24	20L	.5	.010L	9	w193986
w193987	5.0	18	6.1	9.9	.2	.31	20L	.7	.020	10	w193987
w193988	34	24	6.7	18	.2	.37	24	1.1	.040	14	w193988
w193991	15	6.0	7.5	4.4	.3	.17	20L	.2	.030	3	w193991
w193992	6.0	7.0	3.8	4.3	.4	.17	20	.2	.010L	3	w193992
w193993	52	14	11	13	2.0	.34	78	.4	.14	7	w193993
w193994	7.0	9.0	6.9	7.2	.6	.18	32	.2	.030	4	w193994
w193995	16	22	9.3	18	1.8	.39	83	.5	.16	11	w193995
w193996	32	21	10	18	1.6	.32	110	.6	.16	11	w193996
w193997	47	20	9.8	15	1.7	.39	71	.5	.28	11	w193997
w193998	8.0	31	5.4	28	4.6	.48	180	1.0	.020	16	w193998
w193999	10	8.0	3.4	5.5	.5	.18	31	.2	.020	4	w193999
w194000	6.0	35	6.4	31	4.6	.63	260	1.1	.020	16	w194000
w194001	130	19	10	13	1.2	.33	67	.7	.14	10	w194001
w194002	11	14	4.3	10	1.1	.25	53	.5	.020	9	w194002
w194003	22	22	5.6	15	1.6	.35	100	.8	.070	12	w194003
w194004	4.0	8.0	6.8	5.3	.4	.18	30	.2	.010L	4	w194004
w194005	14	7.0	2.1	3.8	.6	.16	22	.2	.010	4	w194005
w194006	1.0	9.0	9.9	5.0	.1	.21	24	.2	.010L	4	w194006
w194007	1.0	10	2.9	4.0	.3	.23	27	.1	.010L	5	w194007
w194008	1.0	7.0	2.8	3.1	.2	.19	20L	.1	.010L	3	w194008
w194009	1.0	11	3.6	4.1	.2	.28	24	.1	.010L	5	w194009
w194010	2.0	21	7.4	12	1.4	.32	46	.7	.010L	15	w194010
w194011	1.0	13	8.0	6.0	.8L	.20	20L	.6	.010L	8	w194011
w194012	6.0	46	6.4	39	6.6	.69	290	1.8	.010	27	w194012
w194013	4.0	54	5.9	46	8.0	.79	370	2.0	.020	31	w194013
w194014	9.0	31	7.9	22	3.5	.45	140	1.1	.12	19	w194014
w194015	20	24	12	16	2.0	.42	110	.6	.020	14	w194015
w194016	1.0	14	11	9.3	.3	.26	22	.5	.020	7	w194016
w194017	1.0	18	7.1	9.1	.4	.33	24	.5	.010L	9	w194017
w194018	2.0	9.0	15	6.8	.2	.20	20L	.5	.010L	6	w194018
w194019	10	20	8.7	11	1.2	.35	58	.4	.020	12	w194019
w194020	1.0	18	9.9	11	1.4	.36	60	.5	.020	9	w194020
w194021	2.0	22	2.6	10	.7	.38	32	.4	.010L	14	w194021
w194880	1.0	52	4.5	47	7.0	.57	1,400	2.6	.080	27	w194880
w199324	18	7.0	5.5	3.8	.6L	.24	20L	1.2	.13	2	w199324
w199325	2.0	8.0	12	4.0	.6L	.23	80	.3	.010	3	w199325

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Th (ppm)	Sample number
w193983	0.1	590	4	B	0.70	1.4	1.9	0.90	0.2	3.0L	w193983
w193984	.1	470	9	B	.30	2.2	2.4	1.3	.2	3.0L	w193984
w193985	.1	530	20	B	.20	1.7	2.2	1.1	.2	3.0L	w193985
w193986	.1	260	12	B	.40	2.0	1.9	1.2	.2	3.0L	w193986
w193987	.1	400	24	B	.50	2.4	2.7	1.6	.3	3.0L	w193987
w193988	.1	780	60	B	.60	3.3	2.4	1.8	.3	3.0L	w193988
w193991	.1	270	8	B	2.1	1.4	1.1	.70	.1	3.0L	w193991
w193992	.1	400	11	B	1.3	1.2	.9	.80	.1	3.0L	w193992
w193993	.2	430	8	B	1.6	3.1	1.5	1.6	.3	3.0L	w193993
w193994	.1	290	14	B	.50	1.5	.9	.90	.1	3.0L	w193994
w193995	.2	380	42	B	.70	3.4	2.2	2.0	.3	19	w193995
w193996	.2	420	110	B	1.0	3.6	2.3	1.7	.3	3.0L	w193996
w193997	.1	330	49	B	.90	3.2	3.4	1.9	.3	3.0L	w193997
w193998	.2	820	17	B	.80	5.9	1.2	2.7	.4	3.0	w193998
w193999	.1	200	7	B	.50	1.1	.9	.80	.2	3.0L	w193999
w194000	.2	710	B	76	1.1	6.7	1.7	2.8	.4	7.0	w194000
w194001	.1	390	160	52L	1.3	2.9	.8	1.7	.3	3.0L	w194001
w194002	.1	590	47	44L	.60	2.3	1.4	1.3	.2	3.0L	w194002
w194003	.2	720	180	24	.80	3.3	1.8	1.9	.2	6.0	w194003
w194004	.1	310	15	39L	.40	1.2	1.2	.90	.2	3.0L	w194004
w194005	.1	340	4	35L	.30	.90	1.0	.80	.1	3.0L	w194005
w194006	.1	230	14	35L	.40	1.1	.9	1.0	.2	3.0L	w194006
w194007	.1	250	59	46L	.20	1.1	.6	1.1	.2	3.0L	w194007
w194008	.1	330	19	32L	.20	.70	.7	.90	.2	3.0L	w194008
w194009	.1	330	76	41L	.20	1.1	.6	1.3	.2	3.0L	w194009
w194010	.1	390	20	42L	.40	2.4	1.2	1.8	.3	3.0L	w194010
w194011	.1	650	9	49L	.60	1.6	2.4	1.0	.2	3.0L	w194011
w194012	.3	850	94	100	1.3	8.2	1.0	4.0	.5	9.0	w194012
w194013	.3	1,100	98	140	1.2	9.9	1.0	4.6	.6	8.0	w194013
w194014	.2	370	130	42	1.1	4.6	1.3	2.8	.4	3.0L	w194014
w194015	.2	560	61	36	1.7	3.4	1.4	2.4	.3	3.0	w194015
w194016	.1	170	17	30L	.50	2.1	2.5	1.3	.2	3.0L	w194016
w194017	.1	150	17	27L	.50	2.5	1.8	1.7	.3	3.0L	w194017
w194018	.1	230	9	31L	.50	1.8	2.5	1.0	.2	7.0	w194018
w194019	.1	360	59	15	1.4	2.3	2.2	2.0	.3	3.0L	w194019
w194020	.1	320	66	17	.50	2.6	1.6	1.6	.2	3.0L	w194020
w194021	.2	740	21	100	.60	2.9	1.9	3.2	.3	3.0L	w194021
w194880	.3	510	18	100	.50	9.8	4.0	3.3	.5	5.0	w194880
w199324	.1	400	14	25L	1.2	1.5	2.8	.90	.2	3.0L	w199324
w199325	.2	200	20	21L	1.1	2.4	2.6	1.0	.2	3.0L	w199325

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	U (ppm)	Yb (ppm)
w193983	1.0	0.4
w193984	1.6	.5
w193985	1.1	.4
w193986	1.2	.5
w193987	1.5	.8
w193988	1.5	.9
w193991	1.3	.5
w193992	1.3	.4
w193993	2.4	1.0
w193994	1.5	.4
w193995	1.8	.9
w193996	3.3	.8
w193997	2.2	.8
w193998	2.9	1.2
w193999	.90	.4
w194000	3.9	1.2
w194001	1.3	.8
w194002	1.6	.5
w194003	1.8	.8
w194004	3.0	.4
w194005	1.1	.3L
w194006	1.1	.4
w194007	1.4	.5
w194008	.70	.3
w194009	1.4	.6
w194010	1.0	.8
w194011	1.0	.4
w194012	3.9	1.6
w194013	4.6	1.9
w194014	3.7	1.1
w194015	3.9	.9
w194016	1.2	.6
w194017	1.4	.8
w194018	.80	.5
w194019	2.3	.7
w194020	2.1	.6
w194021	2.4	.9
w194880	2.8	1.4
w199324	1.1	.8
w199325	1.4	1.0

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	As (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	La (ppm)	Sample number
w199326	1.0	16	14	12	0.5	0.40	88	0.5	0.010L	6	w199326
w199327	42	18	5.6	6.6	.6L	.27	84	.4	.010	9	w199327
w199328	1.0	11	14	7.3	.6L	.25	80	.3	.010	5	w199328
w199329	73	11	24	7.1	.7L	.20	32	.2	.39	5	w199329
w199330	120	16	90	14	.8L	.32	130	.3	.60	6	w199330
w199331	1.0	31	15	27	2.1	.65	320	1.1	.040	14	w199331
w199332	1.0	5.0	15	10	.5L	.27	20L	.4	.010L	2	w199332
w199000	3.0	23	6.0	13	.3	.51	350	.4	.040	14	w199000
w199001	5.0	26	6.1	11	.3	.58	250	.5	.040	15	w199001
w199002	20	24	4.4	18	1.3	.60	150	.7	.11	13	w199002
w199003	3.0	35	16	22	1.3	.58	360	.8	.080	20	w199003
w199004	14	41	4.9	22	1.1	.94	170	.5	.15	25	w199004
w199005	16	11	4.3	5.7	.3	.25	150	.4	.16	6	w199005
w199006	11	17	5.3	17	1.0	.47	91	.5	.050	8	w199006
w199007	10	15	18	12	.5	.30	120	.3	.040	9	w199007
w199008	3.0	46	18	26	1.2	.93	120	1.3	.16	27	w199008
w199009	34	51	14	28	1.4	.89	240	1.3	.13	29	w199009
w199010	1.0	44	7.9	25	1.6	.77	210	1.3	.060	24	w199010
w199011	3.0	24	3.6	13	1.0	.52	130	.5	.080	13	w199011
w199012	7.0	13	3.0	11	.6	.35	35	.3	.12	7	w199012
w199013	3.0	31	7.2	13	.4	.59	27	.5	.080	14	w199013
w199014	27	72	9.3	25	.7	2.6	20L	.5	.11	38	w199014
w199015	2.0	30	16	12	.4	.43	39	.3	.080	19	w199015
w199016	5.0	35	12	16	.5	.54	20L	.6	.080	21	w199016
w199017	11	32	14	18	.4	.49	20L	.6	.080	16	w199017
w199018	6.0	21	11	17	1.0	.45	160	.6	.27	11	w199018
w199019	21	10	9.2	8.3	.8L	.36	170	.4L	.23	4	w199019
w199020	6.0	110	8.6	84	4.9	2.1	390	2.4	.14	58	w199020
w199021	5.0	57	8.0	36	2.7	3.1	120	1.2	.10	41	w199021
w199022	14	31	16	21	1.5	.58	230	.6	.17	18	w199022
w199023	5.0	18	13	10	.5	.37	20L	.3	.070	10	w199023
w199024	12	18	3.4	13	.7	.28	39	.6	.040	10	w199024
w198544	7.0	20	15	23	.8	.36	230	1.0	.19	11	w198544
w198545	21	42	8.4	36	1.4	.67	84	2.5	.49	21	w198545
w198546	19	30	2.5	23	.7	.45	68	1.7	.36	16	w198546
w198547	1.0	35	6.6	26	1.1L	.60	52	2.0	.080	18	w198547
w198548	1.0	37	5.2	28	.9	.71	260	1.7	.070	19	w198548
w199418	2.0	35	6.3	31	1.3	.57	280	1.6	.030	22	w199418
w199419	2.0	25	5.6	24	.6	.40	160	1.3	.020	15	w199419
w199420	10	22	11	26	.5	.38	68	1.5	.13	13	w199420

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Th (ppm)	Sample number
w199326	0.1	200	18	23L	0.50	3.1	3.5	1.6	0.3	3.0L	w199326
w199327	.1	100	12	22L	.40	1.5	5.6	1.3	.2	3.0L	w199327
w199328	.1	100	36	19L	.30	2.1	3.1	1.1	.2	3.0L	w199328
w199329	.1	100	20	23L	.90	1.9	3.6	.90	.5L	3.0L	w199329
w199330	.1	98	10	26L	2.9	2.5	11	1.4	.6L	3.0L	w199330
w199331	.3	400	37	33	.60	5.8	6.7	3.0	.6	3.0L	w199331
w199332	.1	100	12	15L	.60	3.0	5.6	1.0	.3	3.0L	w199332
w199000	.1	600	39	75L	1.0	3.7	4.2	2.4	.3	3.0L	w199000
w199001	.1	700	35	61L	1.4	3.7	4.9	2.8	.4	3.0L	w199001
w199002	.2	200	87	49L	1.8	4.5	2.0	2.5	.4	3.0L	w199002
w199003	.2	400	69	52L	1.4	6.6	1.8	2.9	.4	3.0L	w199003
w199004	.3	200	280	58L	.80	3.9	2.4L	4.4	.7	3.0L	w199004
w199005	.1	200	75	42L	.60	1.9	2.9	1.1	.2	3.0L	w199005
w199006	.2	200	190	48L	2.1	4.0	4.0	2.2	.3	3.0L	w199006
w199007	.1	500	530	57L	1.8	2.8	2.1	1.6	.2	3.0L	w199007
w199008	.3	390	430	62L	.60	6.4	3.1	4.5	.6	3.0L	w199008
w199009	.3	390	200	51L	.80	6.3	3.6	4.6	.7	3.0L	w199009
w199010	.2	300	260	55L	.40	5.6	2.1	3.8	.6	3.0L	w199010
w199011	.1	300	150	45L	2.3	3.2	1.7	2.4	.3	3.0L	w199011
w199012	.1	300	68	45L	2.4	2.6	2.7	1.6	.2	3.0L	w199012
w199013	1	200	190	40L	.50	2.7	1.4	3.0	.5	3.0L	w199013
w199014	.6	300	93	62L	1.2	11	3.5L	13	2	3.0L	w199014
w199015	.1	300	240	49L	1.0	3.7	1.5	2.3	.2	3.0L	w199015
w199016	.1	400	92	50L	2.3	5.8	1.7	2.9	.4	3.0L	w199016
w199017	.1	200	76	41L	2.6	4.8	2.0	2.6	.3	3.0L	w199017
w199018	.1	300	140	43L	1.6	3.8	1.9	2.0	.2	3.0L	w199018
w199019	.2	300	12	39L	2.2	2.4	2.0	1.6	.3	3.0L	w199019
w199020	.5	700	170	84	2.8	27	9.6	10	1	22	w199020
w199021	.7	500	170	37	2.2	10	2.1	14	2	6.0	w199021
w199022	.2	500	150	48L	3.1	4.8	2.6	2.9	.3	3.0L	w199022
w199023	.1	500	110	42L	2.5	3.1	2.1	1.9	.3	3.0L	w199023
w199024	.1	300	140	37L	1.3	2.9	3.3	1.5	.3	3.0L	w199024
w198544	.1	100	28	28L	.30	4.7	7.0	1.7	.4	5.0	w198544
w198545	.3	200	48	20	.80	8.0	12	3.2	.6	6.0	w198545
w198546	.2	300	560	36L	1.0	5.2	5.8	2.2	.8L	8.0	w198546
w198547	2	97	70	30L	.40	6.3	13	2.6	.6	8.0	w198547
w198548	.2	300	62	38L	.50	7.8	6.8	3.1	.6	7.0	w198548
w199418	.2	400	740	30	.50	6.6	4.6	2.7	.4	6.0	w199418
w199419	.1	200	32	41L	.50	4.5	5.7	1.9	.3	6.0	w199419
w199420	.2	100	40	39L	.50	4.9	6.4	1.8	.3	6.0	w199420

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	U (ppm)	Yb (ppm)
w199326	1.3	0.8
w199327	.80	.4
w199328	.90	.6
w199329	1.0	.5
w199330	1.3	.5
w199331	2.5	2.0
w199332	1.1	.8
w199000	1.6	.9
w199001	2.0	1.0
w199002	2.6	1.1
w199003	2.0	1.3
w199004	2.4	2.3
w199005	1.0	.6
w199006	2.1	1.2
w199007	1.6	.7
w199008	2.3	1.9
w199009	2.4	1.9
w199010	2.1	1.6
w199011	2.3	.9
w199012	2.0	.7
w199013	1.5	1.1
w199014	2.2	4.3
w199015	1.6	.7
w199016	1.6	.9
w199017	2.3	.7
w199018	1.8	.8
w199019	1.1	1.1
w199020	7.7	3.6
w199021	4.1	4.8
w199022	2.5	1.1
w199023	2.0	.8
w199024	1.5	.8
w198544	1.1	.7
w198545	2.4	1.7
w198546	1.9	1.0
w198547	1.4	1.3
w198548	1.4	1.1
w199418	1.1	1.3
w199419	.90	.9
w199420	.90	1.4

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	As (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	La (ppm)	Sample number
w199421	18	9.0	1.5	9.7	0.2	0.16	52	0.6	0.10	5	w199421
w199422	7.0	9.0	2.4	10	.5	.17	92	.4	.070	5	w199422
w199425	3.0	27	5.1	25	1.1	.36	100	1.6	.090	17	w199425
w195104	2.0	18	9.0	12	1.2	.28	80	.7	.36	9	w195104
w195105	3.0	19	14	9.9	2.0	.34	27	.5	.24	10	w195105
w195106	1.0	18	8.1	11	1.5	.29	26	.6	.24	10	w195106
w195107	1.0	13	2.9	8.5	.6	.20	52	.5	.37	7	w195107
w195108	23	22	11	13	2.4	.34	220	.7	.74	12	w195108
w195109	6.0	8.0	3.2	3.1	.2	.17	180	.2	.68	5	w195109
w195110	27	17	4.1	13	1.7	.26	92	.5	.48	9	w195110
w195131	9.0	36	6.8	16	.8	.53	100	.9	.20	19	w195131
w195132	3.0	33	5.2	12	1.0	.56	120	.5	.12	21	w195132
w201530	7.0	44	12	63	1.9	.83	100	2.6	.080	21	w201530
w201531	9.0	27	9.2	27	1.4	.52	65	.9	.12	14	w201531
w201532	25	48	6.2	41	3.3	.79	85	1.8	.12	26	w201532
w201533	49	13	3.4	12	.9	.35	27	.5	.12	8	w201533
w201534	34	13	28	9.1	.2	.54	25	.2	.23	6	w201534
w194951	53	10	13	9.8	.5	.23	51	.4	.55	5	w194951
w194952	14	27	7.0	23	1.3	.58	120	.9	.52	15	w194952
w194953	4.0	39	8.0	45	3.1	.70	160	2.5	.39	22	w194953
w194954	34	18	4.1	18	.9	.33	83	.8	.72	10	w194954
w194955	16	23	10	23	.5	.52	59	1.2	.68	12	w194955
w194956	1.0	28	7.9	29	.7	.42	120	1.5	.57	16	w194956
w194957	1.0	30	5.3	33	1.9	.46	120	1.7	.12	18	w194957
w194958	5.0	7.0	2.6	9.1	.3	.12	55	.4	.19	4	w194958
w194959	9.0	7.0	2.3	9.1	.6	.17	19	.4	.21	4	w194959
w194960	13	9.0	1.8	12	.4	.18	59	.4	.30	5	w194960
w194961	8.0	10	2.1	12	.8	.17	120	.7	.58	6	w194961
w194962	9.0	8.0	3.0	8.9	.5	.14	160	.4	.26	5	w194962
w194963	15	9.0	4.3	8.9	.3	.15	51	.4	.74	5	w194963
w194964	8.0	10	2.9	11	.8	.17	87	.5	.42	5	w194964
w194965	6.0	8.0	1.4	9.3	.4	.12	55	.4	.20	5	w194965
w194966	5.0	7.0	1.9	7.6	.6	.13	120	.4	.27	4	w194966
w194967	7.0	17	3.6	17	.9	.28	220	.8	.24	10	w194967
w194968	4.0	9.0	1.5	11	.4	.17	35	.6	.19	5	w194968
w194969	3.0	9.0	1.8	10	.4	.17	34	.5	.22	5	w194969
w194970	18	10	2.3	9.5	.6	.22	59	.4	.21	6	w194970
w194971	30	15	5.1	15	1.2	.28	250	.7	.060	9	w194971
w194972	4.0	7.0	1.6	8.4	.5	.12	83	.4	.050	4	w194972
w194973	7.0	8.0	2.0	9.5	.6	.10	130	.4	.15	4	w194973

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Th (ppm)	Sample number
w199421	0.1	100	27	28L	0.50	1.8	1.4	0.90	0.1	3.0L	w199421
w199422	.1	500	14	45L	2.0L	2.0	1.6	.90	.5L	3.0L	w199422
w199425	.2	200	35	43L	1.8	4.8	7.2	2.0	.3	7.0	w199425
w195104	.1	250	32	4L	.20	2.1	1.8L	1.5	.3	3.0L	w195104
w195105	.1	300	54	6L	.30	2.9	2.2L	2.0	.3	3.0L	w195105
w195106	.1	250	22	6L	.10	2.1	1.1	1.6	.3	3.0L	w195106
w195107	.1	300	44	5L	.20	1.6	1.1	.80	.4L	3.0L	w195107
w195108	.1	400	9	6	1.2	2.7	2.1	1.9	.2	3.0L	w195108
w195109	.1	300	B	6L	.50	.80	1.9	.80	.4L	3.0L	w195109
w195110	.1	400	140	7L	1.0	2.6	1.8	1.4	.2	3.0L	w195110
w195131	.2	600	49	28L	1.2	4.3	2.4	3.0	.4	3.0L	w195131
w195132	.2	500	46	26L	.20	3.1	1.7	3.1	.4	3.0L	w195132
w201530	.4	390	30	41	1.2	12	12	4.2	.6	13	w201530
w201531	.2	200	12	20	.50	7.3	11	2.8	.4	7.0	w201531
w201532	.3	410	15	71	.80	9.2	8.6	3.8	.6	7.0	w201532
w201533	.1	300	5	30L	.90	3.2	3.1	1.7	.3	3.0L	w201533
w201534	.4	100	1	30L	.80	2.8	9.1	2.2	.6	3.0L	w201534
w194951	.1	100	52	51L	1.5	1.8	1.3	1.0	.2	3.0L	w194951
w194952	.2	300	180	74L	.50	5.6	5.7	2.7	.4	5.0	w194952
w194953	.3	610	37	81L	.60	8.9	5.8	3.3	.5	13	w194953
w194954	.1	200	68	58L	.60	3.7	4.8	1.5	.2	5.0	w194954
w194955	.2	200	140	58L	.40	5.5	5.4	2.3	.4	6.0	w194955
w194956	.2	95	6	56L	.30	5.9	9.9	2.2	.3	7.0	w194956
w194957	.2	300	63	61L	.40	6.6	6.7	2.4	.4	6.0	w194957
w194958	.1	400	140	57L	.30	1.8	1.1	.70	.1	5.0	w194958
w194959	.1	200	40	49L	.40	2.2	6.1L	.70	.2	3.0L	w194959
w194960	.1	300	120	47L	.30	2.0	1.4	.80	.1	3.0L	w194960
w194961	.1	200	380	41L	.30	2.6	3.3	1.0	.2	3.0L	w194961
w194962	.1	100	360	31L	.40	2.0	1.4	.80	.1	3.0L	w194962
w194963	.1	550	84	52L	.30	1.7	1.2	.80	.5L	3.0L	w194963
w194964	.1	200	240	40L	.30	2.5	1.3	.90	.2	3.0L	w194964
w194965	.1	400	30	47L	.20	1.7	.6	.70	.5L	3.0L	w194965
w194966	.1	200	260	35L	.30	2.0	4.7L	.80	.2	3.0L	w194966
w194967	.1	290	1,200	43L	.20	4.2	2.5	1.5	.2	3.0L	w194967
w194968	.1	200	28	33L	.20	2.3	1.3	.90	.1	3.0L	w194968
w194969	.1	500	38	44L	.20	2.0	1.3	.80	.1	3.0L	w194969
w194970	.1	100	95	36L	.60	2.8	1.9	1.1	.2	3.0L	w194970
w194971	.1	300	500	42L	.50	3.4	.9	1.5	.2	3.0L	w194971
w194972	.1	100	150	29L	.20	1.6	1.4	.70	.4L	3.0L	w194972
w194973	.1L	300	360	33L	.60	2.1	2.0	.70	.1	3.0L	w194973

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	U (ppm)	Yb (ppm)
w199421	0.20	0.4
w199422	.20L	.4
w199425	.90	.9
w195104	1.1	.7
w195105	2.4	.7
w195106	1.2	.6
w195107	1.3	.5
w195108	3.8	.6
w195109	1.0	.4
w195110	2.1	.6
w195131	2.7	1.1
w195132	1.3	.9
w201530	2.8	2.2
w201531	2.1	1.0
w201532	2.0	1.9
w201533	.70	.8
w201534	.40	2.1
w194951	.90	.6
w194952	1.7	1.1
w194953	2.3	1.8
w194954	1.9	.7
w194955	1.4	1.2
w194956	1.9	.9
w194957	2.0	1.2
w194958	.70	.5
w194959	.90	.5
w194960	1.2	.3
w194961	.90	.6
w194962	.90	.4
w194963	5.1	.3
w194964	.90	.5
w194965	1.1	.4
w194966	.90	.5
w194967	1.2	.7
w194968	1.0	.4
w194969	.90	.4
w194970	1.1	.6
w194971	1.7	.6
w194972	.80	.3
w194973	.90	.3

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	As (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	La (ppm)	Sample number
w194974	10	9.0	1.3	7.2	0.3	0.15	75	0.4	0.37	5	w194974
w194975	10	9.0	2.2	11	.7	.17	120	.4	.26	5	w194975
w194976	11	9.0	2.3	12	.5	.17	83	.5	.22	6	w194976
w194977	9.0	8.0	2.0	9.7	.4	.18	120	.4	.30	5	w194977
w194978	15	18	10	22	1.4	.34	87	.9	.25	9	w194978
w194979	9.0	13	3.3	14	.8	.26	99	.9	.31	7	w194979
w194980	14	7.0	2.0	7.0	.4	.14	63	.3	.48	4	w194980
w194981	13	8.0	3.0	8.7	.4	.19	37	.3	.25	5	w194981
w194982	12	6.0	1.8	5.8	.3	.11	150	.2	.18	3	w194982
w194983	26	7.0	1.3	8.0	.5	.10	63	.4	.22	4	w194983
w194984	9.0	14	7.2	12	1.1	.26	43	.7	.050	9	w194984
w194985	4.0	14	5.4	9.7	1.0	.24	58	.6	.040	8	w194985
w194986	10	17	8.0	13	1.3	.39	43	.4	.030	9	w194986
w194987	16	6.0	3.1	4.5	.8	.13	29	.2	.090	3	w194987
w194988	5.0	7.0	6.2	5.8	.2	.15	37	.3	.070	4	w194988
w194989	12	17	11	8.2	.2	.37	32	.4	.080	10	w194989
w194990	87	8.0	3.9	6.0	.6	.19	31	.3	.070	4	w194990
w194991	47	25	6.8	12	.4	.49	27	.8	.66	13	w194991
w194992	73	43	12	29	1.5	.85	290	1.5	.47	26	w194992
w194993	2.0	22	5.4	26	2.2	.40	43	1.1	.12	12	w194993
w194994	2.0	34	2.7	32	.6	.49	120	2.2	.12	20	w194994
w194995	2.0	44	15	47	2.9	.66	140	2.1	.080	26	w194995
w194996	2.0	23	7.1	19	1.0	.37	51	.9	.050	15	w194996
w194997	2.0	56	5.0	56	5.1	.78	230	2.9	.050	38	w194997
w194998	1.0L	11	4.8	8.2	.2	.22	21	.5	.010	8	w194998
w194999	2.0	41	3.6	13	.4	.35	37	1.3	.030	26	w194999
w195000	1.0	16	13	12	.6	.51	39	.4	.010	11	w195000
w195001	5.0	21	9.1	18	1.0	.34	94	.9	.12	15	w195001
w195002	1.0L	12	8.2	5.0	.2	.30	34	.2	.020	7	w195002
w195003	11	31	13	33	3.9	.49	270	1.2	.16	21	w195003
w195004	1.0	10	5.2	9.7	.3	.25	38	.6	.020	7	w195004
w195009	28	7.0	8.2	7.9	.5	.27	51	.2	.67	4	w195009
w195010	1.0	11	13	14	.2	.31	48	.8	.21	7	w195010
w195011	10	20	4.7	17	.4	.38	42	1.0	.52	13	w195011
w195012	8.0	5.0	8.6	3.6	.2	.29	30	.1	.17	2	w195012
w195013	11	5.0	6.8	4.2	.4	.13	90	.2	.23	3	w195013
w195014	4.0	14	3.9	9.4	.3	.28	74	1.0	.32	9	w195014
w195015	32	8.0	1.9	5.2	.2	.21	45	.3	.72	5	w195015
w195016	5.0	47	8.3	24	1.4	1.0	110	1.4	.21	33	w195016
w195017	13	18	4.0	16	.4	.33	110	.9	.41	13	w195017

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Th (ppm)	Sample number
w194974	0.1L	200	130	69L	0.40	1.7	1.5	0.70	0.3L	3.0L	w194974
w194975	.1	200	240	66L	.50	2.2	1.3	.90	.2	3.0L	w194975
w194976	.1	300	15	74L	.30	2.1	1.2	.90	.2	3.0L	w194976
w194977	.1	400	370	83L	.40	1.9	1.8	.80	.3L	3.0L	w194977
w194978	.1	300	35	83L	.40	3.5	1.7	1.6	.2	3.0L	w194978
w194979	.1	400	190	81L	.30	2.8	2.0	1.2	.2	3.0L	w194979
w194980	.1	200	150	45L	.30	1.4	1.6	.60	.1	3.0L	w194980
w194981	.1	300	290	50L	.30	1.6	1.8	.90	.2	3.0L	w194981
w194982	.1	98	69	42L	.30	1.6	1.1	.50	.3L	3.0L	w194982
w194983	.1	100	210	45L	.60	1.5	.8	.60	.3L	3.0L	w194983
w194984	.1	200	B	58L	1.3	2.5	3.8	1.5	.3	3.0L	w194984
w194985	.1	300	3	55L	.70	2.4	3.6	1.2	.3	3.0L	w194985
w194986	.2	300	7	54L	.90	3.1	1.5	2.0	.3	3.0L	w194986
w194987	.1	200	5	47L	1.2	1.0	1.7	.70	.2	30	w194987
w194988	.1	500	14	48L	1.1	1.3	4.7	.70	.1	3.0L	w194988
w194989	.1	200	10	44L	5.1	2.5	3.2	1.9	.3	3.0L	w194989
w194990	.1	300	36	47L	2.1	1.5	2.1	1.0	.3L	3.0L	w194990
w194991	.2	300	26	47L	1.1	2.7	6.0	2.7	.4	3.0L	w194991
w194992	.3	500	790	59L	3.6	6.0	7.4	4.4	.6	5.0L	w194992
w194993	.2	600	130	54L	.40	4.4	6.7	2.1	.3	3.0L	w194993
w194994	.2	500	48	51L	.60	5.4	8.9	2.6	.4	5.0	w194994
w194995	.3	500	12	54	.70	8.3	3.9	3.6	.4	6.0	w194995
w194996	.1	400	100	44L	.40	3.7	5.1	2.0	.4	3.0L	w194996
w194997	.3	1,600	39	83	.40	10	11	4.7	.5	7.0	w194997
w194998	.1	400	14	30L	.10	1.6	3.4	1.3	.2	3.0L	w194998
w194999	.3	400	23	38L	.60	3.3	2.2	4.0	.5	6.0	w194999
w195000	.3	200	3	31L	1.3	3.8	1.3	2.6	.5	3.0L	w195000
w195001	.1	400	14	35L	.60	3.6	5.8	2.0	.2	3.0L	w195001
w195002	.1	200	10	25L	.20	1.1	3.3	1.6	.2	3.0L	w195002
w195003	.4	890	61	52	1.8	8.6	1.4	3.2	.4	6.0	w195003
w195004	.1	300	13	26L	.40	2.2	3.3	1.3	.2	3.0L	w195004
w195009	.3	300	53	32L	2.8	6.1	3.2	1.3	.3	3.0L	w195009
w195010	.2	300	16	24L	1.1	3.9	6.3	1.7	.3	3.0L	w195010
w195011	.2	300	18	29L	.60	3.9	5.4	2.1	.3	3.0L	w195011
w195012	.3	200	14	24L	3.1	3.9	1.4	1.3	.4	3.0L	w195012
w195013	.1	400	220	26L	.90	2.0	1.7	.70	.2	3.0L	w195013
w195014	.2	400	15	26L	.60	2.4	4.1	1.6	.3	3.0L	w195014
w195015	.1	300	35	26L	.50	2.4	8.8	1.1	.2	3.0L	w195015
w195016	.3	1,300	200	27	.20	6.2	16	5.7	.8	4.0L	w195016
w195017	.2	400	79	30L	1.0	3.6	2.9	2.0	.4	3.0L	w195017

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	U (ppm)	Yb (ppm)
w194974	0.90	0.3
w194975	.90	.4
w194976	1.1	.4
w194977	.80	.3
w194978	2.5	.6
w194979	1.9	.5
w194980	.90	.2
w194981	1.2	.3
w194982	.50	.3
w194983	.90	.3
w194984	1.3	.6
w194985	1.2	.6
w194986	2.3	.7
w194987	1.2	.4
w194988	1.3	.3
w194989	3.4	.7
w194990	2.5	.4
w194991	1.6	1.1
w194992	4.0	1.7
w194993	1.3	.6
w194994	2.6	1.2
w194995	1.9	1.3
w194996	1.3	.6
w194997	2.4	2.0
w194998	.80	.4
w194999	2.6	1.8
w195000	1.8	1.8
w195001	1.4	.8
w195002	.90	.5
w195003	2.7	2.1
w195004	1.1	.9
w195009	2.0	1.7
w195010	2.3	1.4
w195011	1.9	1.0
w195012	1.9	2.0
w195013	1.3	.6
w195014	1.5	.9
w195015	1.0	.6
w195016	1.6	2.1
w195017	2.8	1.2

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	As (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	La (ppm)	Sample number
w195018	2.0	30	3.0	15	0.7	0.38	82	2.1	0.14	17	w195018
w195019	2.0	15	2.6	7.3	.3	.28	94	.7	.11	9	w195019
w195020	4.0	6.0	4.8	4.2	.2	.17	45	.2	.13	3	w195020
w195034	12	9.0	4.6	7.2	.2	.20	30	.4	.45	5	w195034
w195035	3.0	12	5.7	14	1.7	.42	110	.6	.080	6	w195035
w195036	1.0	5.0	4.5	2.7	.5L	.13	48	.1	.070	2	w195036
w195037	2.0	8.0	5.4	5.8	.5L	.19	28	.4	.080	4	w195037
w195038	3.0	13	6.5	8.1	.3	.24	40	.4	.10	7	w195038
w195039	7.0	11	5.0	8.5	.4	.31	37	.3	.030	5	w195039
w195040	1.0	28	8.7	29	1.0	.50	92	1.8	.14	16	w195040
w195041	4.0	15	3.6	13	.5	.24	42	.8	.17	8	w195041
w195042	1.0L	13	18	28	.7	.44	20L	1.0	.11	6	w195042
w195043	1.0	14	4.2	9.9	.4	.24	20L	.9	.020	8	w195043
w195044	11	26	5.3	20	.5	.42	51	1.2	.36	15	w195044
w195045	1.0	22	7.2	19	.2	.29	28	1.3	.21	13	w195045
w195046	16	15	4.6	12	1.1	.29	43	.5	.33	9	w195046
w195047	2.0	11	23	9.5	.7	.35	50	.4	.10	5	w195047
w195048	8.0	4.0	4.3	2.6	.1	.14	20L	.1	.12	2	w195048
w195049	5.0	27	9.4	16	.9	.60	58	.7	.24	14	w195049
w195050	2.0	34	3.4	24	.8	.49	56	2.2	.33	19	w195050
w195051	11	13	3.7	10	1.0	.26	44	.5	.37	7	w195051
w195052	1.0	14	2.4	13	.3	.32	40	.6	.15	7	w195052
w195053	26	15	2.0	11	1.0	.28	68	.6	.49	9	w195053
w195054	2.0	7.0	5.4	4.6	.3	.16	29	.3	.070	4	w195054
w195055	2.0	4.0	4.2	2.9	.3	.14	21	.1	.11	2	w195055
w195056	29	11	5.1	9.0	.8	.20	56	.6	.18	6	w195056
w195057	9.0	16	6.1	14	1.3	.31	44	.8	.11	9	w195057
w195058	1.0	9.0	4.6	5.7	.3	.22	21	.3	.28	4	w195058
w195059	3.0	18	5.2	15	.6	.33	40	.9	.45	12	w195059
w195060	3.0	13	3.8	9.8	.6	.20	29	.6	.10	7	w195060
w195061	1.0	15	4.6	11	.4	.30	40	.6	.080	8	w195061
w195062	5.0	18	8.9	18	.5	.32	96	1.2	.16	10	w195062
w195063	6.0	20	24	20	2.2	.38	76	.6	.21	11	w195063
w195064	38	27	7.2	21	1.8	.47	96	1.0	.26	15	w195064
w195066	8.0	6.0	6.3	5.5	.2	.16	48	.2	.81	9	w195066
w195067	8.0	17	8.9	14	1.0	.41	88	.6	.16	9	w195067
w195068	7.0	11	4.9	8.9	.5	.18	300	.6	.26	6	w195068
w195005	2.0	24	8.3	25	1.4	.44	62	1.2	.030	16	w195005
w195006	5.0	12	14	23	.8	.33	78	.6	.080	8	w195006
w195007	4.0	12	10	9.7	.2L	.33	30	.4	.090	7	w195007

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Th (ppm)	Sample number
w195018	0.3	300	20	29L	0.30	4.2	5.3	3.7	0.6	6.0	w195018
w195019	.2	300	6	25L	.60	2.3	2.2	1.7	.4	3.0L	w195019
w195020	.1	100	19	28L	.60	1.1	3.3	.80	.2	3.0L	w195020
w195034	.1	200	18	31L	.90	1.9	5.1	.90	.1	3.0L	w195034
w195035	.3	200	9	32	3.7	5.3	2.5	1.7	.4	3.0L	w195035
w195036	.1	200	6	25L	.20	.80	2.3	.60	.1	3.0L	w195036
w195037	.1	100	6	24L	.40	1.3	3.8	.70	.1	3.0L	w195037
w195038	.1	99	2	28L	.80	2.3	3.6	1.2	.2	3.0L	w195038
w195039	.1	300	13	33L	1.0	2.4	3.6	1.3	.3	3.0L	w195039
w195040	.3	300	37	26	.80	6.3	5.8	2.6	.4	13	w195040
w195041	.1	100	14	30L	.40	2.7	7.1	1.4	.2	3.0L	w195041
w195042	.3	200	15	33L	1.6	6.5	4.9	2.0	.5	3.0L	w195042
w195043	.1	200	9	37L	.40	2.5	3.1	1.3	.2	3.0L	w195043
w195044	.2	300	12	41L	2.2	5.3	7.4	2.1	.3	3.0L	w195044
w195045	.1	100	13	34L	.40	3.7	6.2	1.5	.2	3.0L	w195045
w195046	.1	200	14	37L	.70	2.8	3.1	1.5	.2	3.0L	w195046
w195047	.2	200	12	37L	2.4	3.2	1.3	1.5	.4	3.0L	w195047
w195048	.1	300	3	35L	1.1	1.2	3.4	.60	.1	3.0L	w195048
w195049	.3	200	91	41L	2.2	5.5	2.2	2.7	.5	3.0L	w195049
w195050	.3	300	45	46L	1.3	5.4	4.0	2.5	.3	6.0	w195050
w195051	.1	300	11	38L	.80	2.6	3.5	1.2	.2	3.0L	w195051
w195052	.2	99	15	30L	.40	3.5	4.2	1.5	.3	3.0L	w195052
w195053	.2	200	33	39L	.80	3.1	3.2	1.4	.2	3.0L	w195053
w195054	.1	200	11	30L	.40	1.8	3.5	.80	.1	3.0L	w195054
w195055	.1	99	7	26L	.60	1.3	2.1	.60	.1	3.0L	w195055
w195056	.1	200	4	33L	.40	2.3	4.6	1.1	.1	3.0L	w195056
w195057	.1	200	9	35L	.30	3.0	4.5	1.3	.2	3.0L	w195057
w195058	.1	200	6	26L	.40	1.7	3.9	1.0	.2	3.0L	w195058
w195059	.1L	200	19	31L	1.6	4.1	3.6	1.9	.3	3.0L	w195059
w195060	.1	200	11	30L	.30	2.2	3.1	1.1	.2	3.0L	w195060
w195061	.1	200	3	27L	.40	3.3	4.1	1.5	.2	3.0L	w195061
w195062	.2	300	27	33L	.90	4.2	4.1	1.6	.3	3.0L	w195062
w195063	.2	200	15	35	1.8	5.0	5.0	1.9	.3	3.0L	w195063
w195064	.2	200	28	32	1.2	4.9	11	2.4	.3	3.0L	w195064
w195066	.2	400	5	33L	1.4	1.9	2.7	1.9	.2	3.0L	w195066
w195067	.2	400	9	27	1.7	4.1	4.1	2.0	.3	3.0L	w195067
w195068	.1	300	19	26L	.40	2.2	3.9	1.0	.1	3.0L	w195068
w195005	.3	400	31	20	1.3	5.4	5.1	2.7	.3	3.0L	w195005
w195006	.4	400	24	33L	2.6	8.8	4.8	1.7	.4	3.0L	w195006
w195007	.1	200	15	24L	1.1	2.0	5.4	1.7	.3	3.0L	w195007

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	U (ppm)	Yb (ppm)
w195018	3.7	1.6
w195019	1.5	1.1
w195020	.80	.7
w195034	1.1	.4
w195035	2.1	1.6
w195036	.50	.3
w195037	.80	.5
w195038	1.3	.4
w195039	1.9	.7
w195040	2.8	1.3
w195041	1.0	.7
w195042	2.7	1.5
w195043	1.3	.7
w195044	2.8	1.1
w195045	1.5	.9
w195046	1.1	.8
w195047	1.2	1.4
w195048	.90	.4
w195049	2.8	1.7
w195050	2.9	1.6
w195051	1.3	.6
w195052	2.1	1.1
w195053	1.4	.9
w195054	.70	.6
w195055	.80	.5
w195056	1.0	.6
w195057	1.2	.7
w195058	1.2	.7
w195059	2.2	1.4
w195060	1.0	.5
w195061	1.3	.8
w195062	2.0	1.0
w195063	2.7	1.1
w195064	3.0	1.1
w195066	.70	1.1
w195067	1.9	1.2
w195068	1.3	.5
w195005	2.2	1.6
w195006	2.8	2.5
w195007	1.2	.9

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	As (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	La (ppm)	Sample number
w195008	1.0	30	3.6	37	1.0	0.47	130	2.3	0.050	21	w195008
w195033	5.0	14	14	11	.8	.28	64	.4	.16	7	w195033
w195021	31	8.0	4.8	6.0	.1	.17	54	.3	.19	4	w195021
w195022	11	19	14	18	.8	.49	170	.5	.42	9	w195022
w195023	1.0	16	5.1	12	.2	.27	34	.8	.11	9	w195023
w195024	1.0	11	8.5	8.9	.3	.17	74	.5	.10	6	w195024
w195025	2.0	28	5.0	11	.8	.45	170	.3	.19	15	w195025
w195026	6.0	10	6.6	8.7	.9	.22	64	.2	.22	5	w195026
w195027	3.0	20	6.1	8.7	.6	.33	80	.3	.080	10	w195027
w195028	5.0	9.0	5.1	7.5	.7	.21	56	.2	.090	4	w195028
w195029	2.0	12	3.4	9.5	.4	.21	30	.6	.020	7	w195029
w195030	1.0	15	8.4	11	.2	.26	28	1.0	.090	8	w195030
w195031	2.0	9.0	19	9.7	.2	.34	34	.3	.060	4	w195031
w195032	7.0	18	4.7	18	.5	.33	51	.9	.16	10	w195032

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Th (ppm)	Sample number
w195008	0.3	400	460	24	0.30	6.6	9.5	2.7	0.4	6.0	w195008
w195033	.2	200	27	17	1.1	3.8	3.5	1.5	.3	3.0L	w195033
w195021	.1	300	19	33L	1.0	1.6	3.6	.80	.2	3.0L	w195021
w195022	.2	300	28	41L	1.8	4.4	7.2	2.4	.4	3.0L	w195022
w195023	.1	200	16	33L	.80	2.7	5.4	1.4	.3	3.0L	w195023
w195024	.1	200	4	33L	.70	1.8	2.8	.90	.1	3.0L	w195024
w195025	.2	300	430	49L	1.1	2.9	1.5	2.5	.3	3.0L	w195025
w195026	.1	400	27	43L	1.9	2.9	1.0	1.0	.2	3.0L	w195026
w195027	.1	400	200	44L	.80	4.0	1.8	1.8	.3	3.0L	w195027
w195028	.1	400	54	39L	2.3	2.8	1.1	1.0	.2	6.0	w195028
w195029	.1	400	11	39L	.50	2.2	3.7	1.0	.2	3.0L	w195029
w195030	.1	100	6	30L	.60	2.5	3.6	1.2	.2	3.0L	w195030
w195031	.2	100	14	30L	.60	3.3	3.9	1.5	.3	3.0L	w195031
w195032	.1	200	20	33L	.30	3.9	4.9	1.5	.2	3.0L	w195032

Table 8g.--Content of 22 trace elements in 254 bituminous coal samples from West Virginia--continued

Sample number	U (ppm)	Yb (ppm)
w195008	2.6	1.5
w195033	1.7	.9
w195021	1.1	.6
w195022	2.7	1.1
w195023	1.3	.7
w195024	.90	.6
w195025	2.0	.8
w195026	1.7	.6
w195027	1.7	.7
w195028	1.4	.5
w195029	1.2	.5
w195030	1.0	.7
w195031	1.5	1.1
w195032	1.1	.7

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis.

[Values in percent or parts-per-million. 22 values are from direct determinations on whole-coal; all other values calculated from analyses of ash. S means analysis by emission spectography; L, less than the value shown; N, not detected; B, not determined.]

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w193726	10	5.4	0.084	0.38	0.023	1.3	1.1	0.28	0.23	2.0	w193726
w193727	2.6	1.7	.10	.094	.024	.084	.74	.091	.05	2.0	w193727
w193728	.94	.48	.012	.027	.009	.099	.12	.024	.02	6.0	w193728
w193729	.71	.56	.038	.022	.009	.013	.50	.015	.05	5.0	w193729
w193941	1.5	1.0	.13	.012	.027	.075	.37	.079	.07	11	w193941
w193942	1.7	.99	.048	.028	.030	.12	1.8	.052	.06	41	w193942
w193943	1.8	1.2	.040	.008	.016	.063	1.3	.099	.08	88	w193943
w193944	.64	.26	.21	.006	.031	.013	.25	.045	.01	7.0	w193944
w193951	1.3	.62	.044	.015	.015	.047	.33	.055	.02	2.0	w193951
w193952	1.5	1.0	.097	.047	.016	.18	.19	.035	.41	5.0	w193952
w193953	.82	.50	.052	.030	.021	.076	.24	.020	.09	4.0	w193953
w193954	1.4	.58	.027	.009	.033	.023	.061	.063	.04	1.0	w193954
w193955	4.0	2.3	.12	.067	.021	.25	.31	.17	.03	4.0	w193955
w193956	6.2	3.3	.11	.11	.037	.54	.30	.20	.02	1.0	w193956
w193957	4.7	2.8	.066	.14	.050	.59	.43	.15	.02	3.0	w193957
w193958	1.1	.70	.39	.084	.069	.12	.69	.046	.02	36	w193958
w193959	1.9	1.3	.048	.057	.028	.36	1.2	.046	.07	69	w193959
w193960	.86	.63	.42	.065	.070	.049	.42	.039	.01	8.0	w193960
w193961	1.6	.93	.054	.033	.023	.058	.37	.064	.04	15	w193961
w193962	1.3	1.0	.047	.043	.022	.10	.28	.054	.04	3.0	w193962
w193963	1.2	.85	.046	.026	.021	.058	.20	.045	.04	1.0	w193963
w193964	1.7	1.1	.054	.045	.021	.13	.64	.055	.06	13	w193964
w193965	.75	.56	.057	.036	.015	.019	.65	.025	.02	5.0	w193965
w193966	3.1	1.8	.045	.062	.032	.31	.55	.097	.05	18	w193966
w193967	1.8	1.3	.039	.055	.039	.24	.57	.054	.04	40	w193967
w193968	.84	.63	.031	.017	.039	.067	.21	.043	.06	6.0	w193968
w193969	2.9	1.7	.059	.092	.083	.34	.50	.093	.06	15	w193969
w193970	2.3	.90	.042	.032	.046	.039	.33	.11	.02	12	w193970
w193971	.84	.56	.035	.039	.031	.055	.34	.034	.02	6.0	w193971
w193972	2.1	.92	.042	.028	.053	.028	.21	.11	.02	2.0	w193972
w193973	1.6	.72	.33	.052	.040	.039	.34	.090	.02	1.0	w193973
w193974	1.0	.55	.058	.036	.021	.077	.93	.027	.05	70	w193974
w193975	1.9	.97	.044	.033	.035	.012	.30	.13	.04	1.0	w193975
w193976	.81	.57	.51	.050	.050	.011	.31	.049	.02	4.0	w193976
w193977	.50	.34	.033	.009	.024	.020	.077	.020	.04	1.0	w193977
w193978	.36	.25	.023	.009	.029	.017	.088	.013	.04	6.0	w193978
w193979	.46	.33	.036	.009	.025	.021	.060	.015	.02	1.0L	w193979
w193980	2.0	1.2	.051	.081	.039	.30	.62	.049	.04	25	w193980
w193981	.49	.41	.043	.016	.020	.013	.16	.022	.05	2.0	w193981
w193982	1.7	.90	.15	.030	.051	.018	.22	.081	.03	2.0	w193982

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Virginia reported on whole-coal basis--continued

Sample number	Au-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Bi-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w193726	3.9L	43	200	5.1	8.6L	0.51	24	6.3	12	0.8	w193726
w193727	1.2L	11	53	1.5	2.6L	.07	9.0	11	4.2	.1	w193727
w193728	.4L	3.6	23	.7	.8L	.04	14	15	6.4	.3L	w193728
w193729	.4L	1.2	33	2.5	.8L	.03	54	13	53	4.8	w193729
w193941	.7L	6.9	90	2.3	1.5L	.16	25	4.8	13	.3	w193941
w193942	.9L	6.0	25	2.7	2.1L	.11	40	6.7	13	.6	w193942
w193943	.9L	3.8	45	2.4	2.0L	.09	20	5.6	12	.2	w193943
w193944	.3L	5.4	12	.5	.6L	.00	11	2.6	3.2	.5L	w193944
w193951	.5L	5.6	56	2.7	1.1L	.03	9.0	5.1	11	.2	w193951
w193952	.7L	30	44	3.8	1.5L	.06	11	22	9.6	.6	w193952
w193953	.4L	5.3	210	5.7	.8L	.08	10	12	6.2	1.3	w193953
w193954	.5L	4.6	46	4.6	1.0L	.02	9.0	7.0	7.1	.1	w193954
w193955	1.5L	27	43	1.6	3.3L	.03	26	3.5	23	1.4	w193955
w193956	2.2L	38	99	1.8	4.9L	.02L	35	9.0	30	3.0	w193956
w193957	1.8L	15	180	2.0	4.0L	.07	29	7.4	24	3.1	w193957
w193958	.7L	9.8	70	.9	1.5L	.04	15	8.6	9.0	.9	w193958
w193959	.9L	8.3	46	2.3	2.0L	.09	19	4.1	11	2.2	w193959
w193960	.5	9.2	70	.6	1.2L	.03	14	8.4	6.7	.4	w193960
w193961	.6L	5.6	40	1.8	1.4L	.07	19	6.1	10	.4	w193961
w193962	.6L	6.6	47	.8	1.3L	.07	14	2.1	8.7	.6	w193962
w193963	.5L	4.7	41	2.2	1.1L	.06	17	11	9.9	.3	w193963
w193964	.8L	5.2	65	1.7	1.7L	.11	20	5.3	12	1.0	w193964
w193965	.4L	2.7	50	.9	.9L	.04	13	6.6	7.4	.2	w193965
w193966	1.3L	9.3	66	2.4	2.8L	.19	30	4.4	18	2.4	w193966
w193967	.8L	8.2	38	2.0	1.8L	.06	15	6.0	15	1.7	w193967
w193968	.4L	5.2	35	1.3	.9L	.05	11	6.7	9.2	.3	w193968
w193969	1.2L	13	69	2.0	2.6L	.11	19	7.1	17	1.5	w193969
w193970	.8L	11	48	2.0	1.8L	.03	21	6.9	14	.2	w193970
w193971	.4L	6.6	39	.9	.9L	.03	9.0	4.0	5.5	.3	w193971
w193972	.8L	11	67	3.3	1.7L	.03	23	11	15	.1	w193972
w193973	.7L	7.5	58	2.4	1.5L	.03	15	10	8.5	.1	w193973
w193974	.6L	1.2	25	1.9	1.3L	.06	14	12	7.9	.4	w193974
w193975	.7L	8.8	36	1.9	1.6L	.05	25	7.9	15	.8L	w193975
w193976	.5L	5.6	43	.6	1.1L	.03	14	9.2	6.1	.9L	w193976
w193977	.2L	3.5	12	2.2	.5L	.04	9.0	9.5	4.4	.1	w193977
w193978	.2L	2.6	7	2.6	.4L	.05	8.0	7.8	5.3	.1	w193978
w193979	.2L	3.2	11	1.1	.5L	.03	9.0	11	4.1	.1	w193979
w193980	.9L	6.9	130	2.0	2.0L	.13	19	12	12	1.1	w193980
w193981	.3L	2.3	39	1.1	.6L	.02	9.0	8.1	5.4	.6L	w193981
w193982	.7L	8.2	27	1.7	1.5L	.02	22	4.4	12	.2	w193982

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	Sample number
w193726	47	13L	3.9L	0.40	300	14	2.7L	2.7	0.7	0.030	w193726
w193727	14	3.7L	1.4	.18	68	3.9	.94	.94	.3	.17	w193727
w193728	7.2	1.2L	.4L	.27	20L	1.3	.58	.18L	.3	.090	w193728
w193729	8.7	1.4	.8	.92	20L	1.2	1.4	1.3	2.4	.13	w193729
w193941	30	2.2L	1.5	.51	170	3.7	2.7	.76	.7	.10	w193941
w193942	23	3.4	2.3	.85	42	5.5	3.3	.66	.7	.38	w193942
w193943	28	2.9L	1.3	.46	30	4.4	1.3	1.5	1.0	.14	w193943
w193944	9.7	.9L	.3	.14	20L	1.3	.27	.14	.3	.010L	w193944
w193951	18	1.6L	.6	.20	38	6.6	.71	5.1	.5	.010L	w193951
w193952	18	2.2L	1.0	.32	51	8.2	1.6	1.5	.3	.090	w193952
w193953	38	1.2L	.7	.32	50	8.0	1.9	5.3	.2	.010	w193953
w193954	17	1.5L	.5L	.18	20L	3.6	.64	1.8	.5	.010L	w193954
w193955	21	4.7L	1.5L	.41	69	6.2	1.0L	.74L	1.3	.070	w193955
w193956	13	7.2L	2.2L	.60	130	9.9	1.6L	1.1L	1.6	.010L	w193956
w193957	18	5.8L	1.8L	.48	150	6.3	1.3L	.91L	1.2	.030	w193957
w193958	13	2.2L	.7L	.25	37	2.4	.84	.35L	.5	.10	w193958
w193959	19	3.0L	.9L	.29	72	4.4	1.4	.47L	.4	.21	w193959
w193960	12	1.7L	.5L	.21	30	1.7	.81	.27L	.4	.050	w193960
w193961	16	2.0L	.7	.31	34	2.6	.88	.32L	.8	.050	w193961
w193962	14	1.9L	.6L	.25	37	2.9	.84	.30L	.6	.020	w193962
w193963	14	1.6L	.5	.29	31	2.7	.65	.30	.6	.010L	w193963
w193964	23	2.4L	.8L	.38	40	3.3	.99	.46	.5	.030	w193964
w193965	8.8	1.3L	.5	.25	20	2.0	.76	.25	.4	.080	w193965
w193966	36	4.0L	1.3L	.51	84	5.1	.88L	.63L	.9	.060	w193966
w193967	16	2.6L	.8L	.29	57	4.3	.57L	3.9	.4	.090	w193967
w193968	18	1.3L	.6	.22	35	3.4	.80	1.2	.4	.040	w193968
w193969	26	3.8L	1.2L	.34	84	5.0	.95	1.1	.8	.060	w193969
w193970	15	2.6L	.8L	.28	27	2.8	.57L	.57	1.0	.050	w193970
w193971	7.4	1.3L	.4L	.14	27	1.9	.49	.21L	.4	.020	w193971
w193972	18	2.4L	.8	.31	27	3.9	.84	1.1	1.1	.010L	w193972
w193973	12	2.2L	.8	.23	26	3.4	1.6	.95	.7	.020	w193973
w193974	13	1.9L	.8	.58	38	3.6	1.9	1.0	.4	.31	w193974
w193975	18	2.3L	.7L	.36	20L	3.7	1.2	.73	1.2	.020	w193975
w193976	13	1.6L	.6	.21	20L	2.0	.61	.26	.5	.030	w193976
w193977	13	.7L	.3	.21	21	2.0	.59	1.9	.2	.010L	w193977
w193978	13	.5L	.2	.20	20L	2.4	.19	2.9	.2	.010L	w193978
w193979	6.9	.7L	.4	.24	20L	2.1	.61	.50	.2	.010L	w193979
w193980	26	2.9L	.9L	.34	91	5.6	.73	.64	.4	.10	w193980
w193981	17	.8L	.3	.22	20L	1.8	.31	.31	.2	.010L	w193981
w193982	14	2.2L	.7	.33	20L	2.9	1.0	.68	.9	.010	w193982

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Ho-S (ppm)	In-S (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Sample number
w193726	2.7L	2.7L	12	59	0.1	66	0.78L	8.2	27	33	w193726
w193727	.82L	.82L	5	15	.1	15	.70	2.1	11	9.9	w193727
w193728	.25L	.25L	9	5.8	.1	3.6	.97	.83	4.0	13	w193728
w193729	.27L	.27L	28	4.9	.5	6.1	3.6	.91	8.0	12	w193729
w193941	.69L	.48L	14	8.3	.2	23	2.2	1.9	16	9.7	w193941
w193942	.66L	.66L	19	11	.3	15	3.9	.75	23	15	w193942
w193943	.64L	.64L	9	21	.2	9.2	3.5	1.7	7.9	13	w193943
w193944	.19L	.19L	9	2.7	.1L	5.7	2.1	.49	4.6	10	w193944
w193951	.36L	.36L	6	6.6	.1	4.1	.87	.87	2.6	11	w193951
w193952	.48L	.48L	5	6.8	.2	7.5	.88	.48	5.7	22	w193952
w193953	.38L	.27L	4	3.8	.2	12	.65	.72	5.3	12	w193953
w193954	.32L	.32L	5	6.0	.1	1.4	.23	1.8	5.1	12	w193954
w193955	1.0L	1.0L	14	24	.2	16	.74	1.6	6.8L	8.6	w193955
w193956	1.6L	1.6L	19	21	.2	19	.45L	6.3	10L	12	w193956
w193957	1.3L	1.3L	15	25	.2	20	.54	1.8	8.3L	9.1	w193957
w193958	.49L	.49L	9	9.1	.1	30	.77	.63	3.2L	6.0	w193958
w193959	.65	.65L	12	14	.1	6.6	3.3	.93	6.4	6.4	w193959
w193960	.38L	.38L	8	9.2	.1	30	.59	.70	3.8	5.9	w193960
w193961	.44L	.44L	11	11	.1	3.6	1.6	2.3	6.2	9.5	w193961
w193962	.42L	.42L	8	9.0	.1	4.3	1.5	1.3	6.6	9.0	w193962
w193963	.35L	.35L	9	12	.1	2.5	1.5	1.2	3.9	9.5	w193963
w193964	.53L	.53L	11	14	.2	22	1.7	.99	6.1	7.3	w193964
w193965	.42L	.29L	7	8.8	.1	20	1.3	.59	4.1	8.0	w193965
w193966	.88L	.88L	16	20	.2	24	1.5	1.4	8.6	6.9	w193966
w193967	.57L	.57L	8	17	.1	11	1.1	.82	3.8L	8.2	w193967
w193968	.28L	.28L	6	10	.1	2.3	1.3	1.0	6.4	11	w193968
w193969	.83L	.83L	10	20	.1	14	1.9	1.7	7.1	10	w193969
w193970	.57L	.57L	12	19	.1	8.9	.97	2.6	4.6	11	w193970
w193971	.29L	.29L	6	7.4	.1	8.6	1.1	.78	3.4	9.0	w193971
w193972	.53L	.53L	15	19	.1	8.4	.46	3.2	6.3	14	w193972
w193973	6.8L	.48L	9	10	.1	27	1.6	2.9	4.1	12	w193973
w193974	.41L	.41L	6	7.0	.2	16	1.3	.75	7.5	12	w193974
w193975	.51L	.51L	15	20	.1	7.3	1.5	3.2	9.5	9.5	w193975
w193976	.36L	.36L	8	11	.1	24	.56	.82	2.3L	3.8	w193976
w193977	.15L	.15L	5	3.3	.1	1.4	.66	.46	2.2	11	w193977
w193978	.12L	.12L	4	2.6	.1	1.6	.48	.17	1.9	7.8	w193978
w193979	.15	.15L	5	3.4	.1	1.3	.46	.25	3.2	13	w193979
w193980	.64L	.64L	10	13	.1	15	2.6	.46	8.0	18	w193980
w193981	.18L	.18L	5	6.8	.1	4.9	.91	.31	2.9	6.8	w193981
w193982	.48L	.48L	13	14	.1	11	.68	2.1	3.3	8.2	w193982

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	P (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Re-S (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sample number
w193726	140	43	39L	14	3.9L	0.30	2.6	1.9	2.2	2.7L	w193726
w193727	20	8.2	8.0L	13L	1.2L	.10	1.0	1.5	.90	.82L	w193727
w193728	8	2.6	2.4L	13L	.36L	1.0	1.2	2.0	1.4	.43	w193728
w193729	7	6.1	2.6L	79	.38L	1.0	12	7.3	5.5	.27L	w193729
w193941	810	6.9	4.7L	17L	.69L	1.7	3.0	3.7	2.6	.48L	w193941
w193942	74	4.7	9.4L	21L	.94L	2.0	3.6	6.0	4.2	.66L	w193942
w193943	120	5.3	6.3L	15L	.92L	1.5	3.0	4.8	2.1	.64L	w193943
w193944	39	2.5	1.8L	17L	.27L	.10	.80	1.5	.80	.19L	w193944
w193951	76	4.5	3.5L	11L	.51L	1.1	2.8	2.0	.90	.36L	w193951
w193952	33	8.2	4.6L	11L	.68L	1.0	2.5	4.7	1.5	.48L	w193952
w193953	32	6.1	2.6	10L	.38L	3.6	3.1	1.9	1.3	.27L	w193953
w193954	4	4.5	3.1L	11L	.46L	.70	1.6	2.1	.90	.32L	w193954
w193955	32	12	10L	5	1.5L	.50	4.8	6.6	2.1	1.0L	w193955
w193956	10	9.9	15L	10	2.2L	.40	5.9	4.3	2.9	1.6L	w193956
w193957	40	8.3	12L	9	1.8L	.90	5.3	3.7	2.4	1.3L	w193957
w193958	B	4.6	4.8L	71L	.70L	1.3	1.8	2.1	1.2	.56	w193958
w193959	16	6.1	6.3L	49L	.93L	2.8	2.3	3.1	1.6	.65L	w193959
w193960	7	3.4	3.7L	51L	.54L	.50	1.5	1.6	1.1	.49	w193960
w193961	8	5.6	4.3L	37L	.63L	.60	2.3	2.3	1.6	.44L	w193961
w193962	13	5.6	4.1L	35L	.60L	.40	1.9	1.8	1.3	.42L	w193962
w193963	7	4.6	3.4L	37L	.50L	.20	2.1	1.6	1.4	.80	w193963
w193964	13	6.5	5.2L	40L	.76L	.60	2.7	3.3	2.0	.53L	w193964
w193965	4	3.8	2.9L	32L	.42L	.50	1.6	2.2	1.2	.42	w193965
w193966	22	9.8	8.5L	44L	1.3L	.80	4.5	6.4	2.8	1.1	w193966
w193967	14	4.8	5.6L	46L	.82L	1.1	2.7	2.4	1.5	.57L	w193967
w193968	38	4.4	2.7L	43L	.40L	.60	2.1	2.4	1.1	.28L	w193968
w193969	31	7.1	8.1L	54L	1.2L	.80	3.4	2.1	1.7	.83L	w193969
w193970	50	5.7	5.5L	39L	.81L	.40	2.7	1.7	1.6	.97	w193970
w193971	16	2.5	2.8L	31L	.41L	.20	1.3	1.1	.70	.29L	w193971
w193972	56	7.0	5.2L	43L	.76L	.30	2.9	1.9	1.7	.53L	w193972
w193973	12	6.8	4.6L	39L	.68L	.50	2.2	2.3	1.2	.82	w193973
w193974	23	3.7	3.9L	36L	.58L	3.1	2.1	2.6	3.1	.58	w193974
w193975	45	8.0	5.0L	38L	.73L	.50	3.4	3.9	1.9	1.2	w193975
w193976	42	4.0	3.5L	42L	.51L	.40	1.7	2.7	1.1	.66	w193976
w193977	20	2.6	1.5L	32L	1.0L	.50	1.3	.8	1.1	.15L	w193977
w193978	15	2.4	1.2L	32L	.17L	.80	1.4	1.3	1.0	.20	w193978
w193979	21	1.6	1.4L	30L	.21L	.20	1.2	.6	1.2	.36	w193979
w193980	52	6.6	6.2L	B	.91L	1.4	2.7	2.1	1.8	.64L	w193980
w193981	6	3.9	1.8L	B	.26L	.20	1.7	1.3	1.0	.26	w193981
w193982	12	6.1	4.6L	B	.68L	.50	2.8	2.6	1.6	.82	w193982

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	Tm-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Sample number
w193726	59	0.3	9.0	3.9L	2.0L	3.0	59	20	0.8	160	w193726
w193727	37	.1	3.0L	1.2L	.59L	1.0	16	9.2	.3	14	w193727
w193728	32	.2	3.0L	.36L	.18L	.40	5.4	2.7	.4	3.2	w193728
w193729	49	.8	3.0L	.38L	.19L	.30	7.6	6.1	2.4	3.3	w193729
w193941	180	.4	3.0L	.69L	.35L	2.5	19	16	1.1	12	w193941
w193942	33	.7	3.0L	.94L	.47L	3.2	22	17	2.0	24	w193942
w193943	34	.3	3.0L	.92L	.46L	1.2	17	6.2	1.0	3.1	w193943
w193944	30	.1	3.0L	.27L	.14L	.30	3.8	2.0	.2	1.4	w193944
w193951	51	.2	7.0	.51L	.26L	1.9	9.7	5.6	.7	3.5	w193951
w193952	41	.3	3.0L	.68L	.34L	1.4	14	14	1.0	16	w193952
w193953	36	.3	3.0L	.38L	.19L	2.2	13	19	1.4	33	w193953
w193954	34	.2	3.0L	.46L	.23L	1.7	6.0	8.7	.6	2.8	w193954
w193955	37	.3	3.0L	1.5L	.74L	2.2	24	3.6	.9	8.6	w193955
w193956	47	.4	3.0L	2.2L	1.1L	1.9	34	5.4	1.2	8.7	w193956
w193957	42	.3	26	1.8L	.91L	1.8	27	7.2	1.2	22	w193957
w193958	53	.2	3.0L	1.1	.35L	1.8	5.3	3.6	.5	8.4	w193958
w193959	28	.2	3.0L	2.4	.47L	2.6	12	6.3	.6	11	w193959
w193960	53	.2	3.0L	.54L	.27L	1.3	3.8	3.6	.4	5.9	w193960
w193961	54	.3	3.0L	.69	.32L	1.9	10	5.3	.6	8.8	w193961
w193962	57	.2	3.0L	.60L	.30L	1.8	11	4.0	.5	5.9	w193962
w193963	50	.2	3.0L	.50L	.25L	1.3	9.0	2.9	.6	18	w193963
w193964	47	.3	3.0L	.84	.38L	1.9	13	4.4	.9	12	w193964
w193965	42	.2	3.0L	.42L	.21L	1.3	5.9	4.2	.7	2.4	w193965
w193966	33	.4	3.0L	1.3L	.63L	2.2	19	5.9	1.2	24	w193966
w193967	25	.2	6.0	2.1	.41L	1.4	14	2.1	.7	8.2	w193967
w193968	39	.2	3.0L	.40L	.20L	1.8	12	4.4	.5	1.8	w193968
w193969	32	.3	3.0L	1.3	.60L	2.1	23	5.0	.8	10	w193969
w193970	41	.3	3.0L	.81L	.41L	1.5	11	3.8	.7	5.3	w193970
w193971	34	.1	3.0L	.41L	.21L	.90	5.3	2.1	.3	4.9	w193971
w193972	52	.3	3.0L	.76L	.38L	1.5	11	4.1	.7	4.0	w193972
w193973	67	.3	3.0L	.68L	.34L	1.4	10	6.3	.6	4.2	w193973
w193974	31	.4	3.0L	2.4	.29L	1.9	7.5	6.4	1.0	9.3	w193974
w193975	53	.3	3.0L	.73L	.37L	1.8	13	5.9	.8	3.1	w193975
w193976	46	.2	3.0L	.51L	.26L	1.4	3.7	2.8	.4	1.7	w193976
w193977	33	.2	3.0L	.22L	.11	1.0	5.3	2.4	.5	6.2	w193977
w193978	24	.2	3.0L	.17L	.09L	1.2	3.9	1.9	.4	9.0	w193978
w193979	36	.2	3.0L	.21L	.11L	.80	4.6	4.0	.5	4.4	w193979
w193980	46	.2	3.0L	1.8	.46L	3.2	17	4.6	.7	24	w193980
w193981	70	.2	3.0L	.26L	.13L	1.1	6.2	2.9	.5	3.1	w193981
w193982	44	.3	3.0L	.68L	.34L	1.7	8.2	5.6	.7	2.2	w193982

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Zr-S (ppm)
w193726	63
w193727	21
w193728	5.8
w193729	12
w193941	23
w193942	10
w193943	22
w193944	3.8
w193951	7.7
w193952	6.3
w193953	6.1
w193954	18
w193955	14
w193956	56
w193957	22
w193958	7.7
w193959	8.0
w193960	7.6
w193961	13
w193962	9.0
w193963	7.0
w193964	8.4
w193965	5.5
w193966	12
w193967	6.2
w193968	8.4
w193969	12
w193970	18
w193971	5.7
w193972	24
w193973	29
w193974	7.0
w193975	22
w193976	10
w193977	2.4
w193978	1.5
w193979	2.5
w193980	7.1
w193981	2.3
w193982	15

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w193983	0.82	0.54	0.30	0.064	0.059	0.016	0.31	0.039	0.02	4.0	w193983
w193984	1.1	.85	.056	.040	.047	.032	.34	.053	.04	4.0	w193984
w193985	.93	.85	.075	.049	.053	.022	.38	.045	.04	6.0	w193985
w193986	1.2	.86	.058	.039	.026	.033	.37	.052	.05	2.0	w193986
w193987	1.7	.79	.062	.032	.040	.025	.35	.078	.03	5.0	w193987
w193988	2.5	1.2	.045	.035	.078	.057	.27	.11	.04	34	w193988
w193991	.52	.38	.030	.016	.027	.055	.36	.018	.05	15	w193991
w193992	.58	.41	.031	.018	.040	.058	.22	.019	.02	6.0	w193992
w193993	1.8	1.2	.043	.077	.043	.29	1.1	.051	.03	52	w193993
w193994	1.1	.90	.059	.042	.029	.11	.50	.028	.02	7.0	w193994
w193995	2.5	1.4	.036	.10	.038	.39	.63	.062	.04	16	w193995
w193996	3.0	2.0	.047	.099	.042	.44	.63	.085	.04	32	w193996
w193997	2.1	1.5	.041	.067	.033	.28	.93	.056	.03	47	w193997
w193998	4.9	2.8	.073	.19	.082	.80	.67	.14	.06	8.0	w193998
w193999	.67	.62	.038	.025	.020	.060	.45	.018	.03	10	w193999
w194000	6.9	3.7	.081	.31	.071	1.1	.75	.19	.06	6.0	w194000
w194001	2.3	1.2	.11	.059	.039	.13	.73	.068	.04	130	w194001
w194002	1.4	.97	.037	.053	.059	.19	.39	.053	.04	11	w194002
w194003	2.1	1.4	.065	.069	.072	.30	.63	.086	.07	22	w194003
w194004	.65	.56	.039	.029	.031	.059	.24	.020	.05	4.0	w194004
w194005	.71	.46	.014	.024	.034	.090	.21	.014	.05	14	w194005
w194006	.58	.52	.035	.025	.023	.023	.24	.017	.03	1.0	w194006
w194007	.65	.56	.033	.019	.025	.049	.28	.015	.03	1.0	w194007
w194008	.37	.34	.027	.015	.033	.018	.23	.009	.03	1.0	w194008
w194009	.54	.46	.031	.013	.033	.034	.13	.016	.02	1.0	w194009
w194010	2.3	1.2	.047	.063	.039	.14	.31	.075	.05	2.0	w194010
w194011	.93	.60	.46	.051	.065	.015	.27	.052	.02	1.0	w194011
w194012	9.4	5.1	.10	.33	.085	1.4	.93	.24	.07	6.0	w194012
w194013	12	6.2	.11	.45	.11	1.9	1.1	.27	.04	4.0	w194013
w194014	4.2	2.7	.067	.13	.037	.62	.49	.12	.05	9.0	w194014
w194015	3.5	1.9	.063	.13	.056	.50	.74	.084	.06	20	w194015
w194016	1.6	.95	.032	.033	.017	.075	.28	.050	.04	1.0	w194016
w194017	1.9	1.3	.033	.039	.015	.10	.25	.050	.05	1.0	w194017
w194018	1.3	.73	.035	.030	.023	.057	.30	.051	.05	2.0	w194018
w194019	1.8	1.1	.053	.060	.036	.20	.39	.052	.06	10	w194019
w194020	2.4	1.2	.062	.063	.032	.24	.64	.063	.05	1.0	w194020
w194021	1.4	.97	.037	.033	.074	.13	.23	.040	.03	2.0	w194021
w194880	11	5.1	.089	.35	.051	1.4	.98	.34	.04L	1.0	w194880
w199324	.39	.38	.080	.014	.040	.027	.23	.009	.02	18	w199324
w199325	.51	.46	.066	.010	.020	.009	.066	.018	.03	2.0	w199325

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Au-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Bi-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w193983	0.5L	6.9	60	1.2	1.0L	0.03	12	9.5	7.2	0.2	w193983
w193984	.5L	7.3	46	1.7	1.1L	.04	17	8.7	10	.2	w193984
w193985	.5L	7.5	50	1.2	1.1L	.05	15	2.8	7.4	.1	w193985
w193986	.5L	4.8	51	1.9	1.2L	.03	15	17	10	.2	w193986
w193987	.6L	7.4	60	1.7	1.4L	.05	18	6.1	9.9	.2	w193987
w193988	.9L	15	48	4.3	2.0L	.09	24	6.7	18	.2	w193988
w193991	.3L	4.5	150	1.6	.7L	.06	6.0	7.5	4.4	.3	w193991
w193992	.3L	7.3	46	1.1	.6L	.03	7.0	3.8	4.3	.4	w193992
w193993	.9L	6.1	100	5.6	2.0L	.09	14	11	13	2.0	w193993
w193994	.6L	6.1	29	1.4	1.2L	.06	9.0	6.9	7.2	.6	w193994
w193995	1.1L	12	52	1.2	2.3L	.05	22	9.3	18	1.8	w193995
w193996	1.3L	14	57	1.5	2.8L	.08	21	10	18	1.6	w193996
w193997	1.0L	9.9	42	1.3	2.2L	.07	20	9.8	15	1.7	w193997
w193998	2.0L	22	200	2.6	4.3L	.07	31	5.4	28	4.6	w193998
w193999	.4L	2.7	35	.7	.8L	.04	8.0	3.4	5.5	.5	w193999
w194000	2.8L	28	170	2.0	6.2L	.10	35	6.4	31	4.6	w194000
w194001	1.0L	5.3	63	2.0	2.1L	.04	19	10	13	1.2	w194001
w194002	.6L	6.9	54	.8	1.4L	.04	14	4.3	10	1.1	w194002
w194003	1.0L	12	95	1.4	2.1L	.07	22	5.6	15	1.6	w194003
w194004	.3L	3.1	51	1.6	.7L	.05	8.0	6.8	5.3	.4	w194004
w194005	.3L	3.1	37	1.2	.7L	.04	7.0	2.1	3.8	.6	w194005
w194006	.3L	2.5	34	1.5	.7L	.03	9.0	9.9	5.0	.1	w194006
w194007	.3L	3.6	89	1.0	.7L	.06	10	2.9	4.0	.3	w194007
w194008	.2L	3.1	19	.6	.5L	.04	7.0	2.8	3.1	.2	w194008
w194009	.3L	4.6	65	1.0	.6L	.02	11	3.6	4.1	.2	w194009
w194010	.9L	9.9	67	2.3	2.0L	.06	21	7.4	12	1.4	w194010
w194011	.5L	9.2	51	1.7	1.2L	.04	13	8.0	6.0	.8L	w194011
w194012	3.6L	34	240	3.2	7.9L	.10	46	6.4	39	6.6	w194012
w194013	4.5L	39	240	3.1	9.9L	.10	54	5.9	46	8.0	w194013
w194014	1.8L	14	110	1.8	3.9L	.10	31	7.9	22	3.5	w194014
w194015	1.4L	14	150	2.4	3.1L	.15	24	12	16	2.0	w194015
w194016	.6L	3.9	22	2.2	1.4L	.06	14	11	9.3	.3	w194016
w194017	.8L	4.0	27	2.3	1.7L	.06	18	7.1	9.1	.4	w194017
w194018	.5L	4.6	32	2.3	1.2L	.04	9.0	15	6.8	.2	w194018
w194019	.8L	7.7	55	2.8	1.7L	.14	20	8.7	11	1.2	w194019
w194020	1.0L	7.1	57	2.9	2.1L	.13	18	9.9	11	1.4	w194020
w194021	.6L	5.5	24	1.5	1.3L	.04	22	2.6	10	.7	w194021
w194880	4.0L	40	150	2.8	6.0L	.07	52	4.5	47	7.0	w194880
w199324	.2L	23	35	1.9	.3L	.05	7.0	5.5	3.8	.6L	w199324
w199325	.3L	25	28	3.8	.4L	.05	8.0	12	4.0	.6L	w199325

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	Sample number
w193983	11	1.5L	0.5L	0.19	20L	3.0	0.51	0.74	0.5	0.040	w193983
w193984	15	1.7L	.5L	.25	20L	2.8	.57	.36	.7	.040	w193984
w193985	14	1.6L	.5	.22	21	2.1	1.4	.25L	.5	.070	w193985
w193986	16	1.7L	.5L	.24	20L	3.7	.54	.65	.5	.010L	w193986
w193987	13	2.0L	.6L	.31	20L	2.2	.56	.31L	.7	.020	w193987
w193988	19	2.9L	.9L	.37	24	3.2	.73	.46	1.1	.040	w193988
w193991	11	1.0L	.3L	.17	20L	2.9	.42	2.4	.2	.030	w193991
w193992	9.0	.9L	.3	.17	20	2.3	.41	1.5	.2	.010L	w193992
w193993	28	3.0L	.9L	.34	78	5.8	.65L	4.5	.4	.14	w193993
w193994	10	1.8L	.6L	.18	32	2.1	.50	1.2	.2	.030	w193994
w193995	17	3.4L	1.1L	.39	83	4.7	.74L	.95	.5	.16	w193995
w193996	26	4.1L	1.3L	.32	110	5.8	.90L	.77	.6	.16	w193996
w193997	18	3.3L	1.0L	.39	71	4.7	.71L	.51L	.5	.28	w193997
w193998	24	6.3L	2.0L	.48	180	11	1.4	.99L	1.0	.020	w193998
w193999	10	1.2L	.4L	.18	31	2.2	.27	.72	.2	.020	w193999
w194000	34	9.1L	2.8L	.63	260	16	2.5	1.4L	1.1	.020	w194000
w194001	12	3.0L	1.2	.33	67	4.6	2.0	1.3	.7	.14	w194001
w194002	13	2.0L	.6L	.25	53	4.2	.76	.32L	.5	.020	w194002
w194003	20	3.1L	1.0L	.35	100	6.0	1.1	.48L	.8	.070	w194003
w194004	15	1.1L	.3L	.18	30	2.1	.54	.54	.2	.010L	w194004
w194005	11	1.0L	.3L	.16	22	2.3	.50	.25	.2	.010	w194005
w194006	16	2.1	.3L	.21	24	1.3	.50	.43	.2	.010L	w194006
w194007	14	1.1L	.3L	.23	27	1.8	.83	.20	.1	.010L	w194007
w194008	10	.7L	.2L	.19	20L	1.0	.64	.15	.1	.010L	w194008
w194009	9.2	.9L	.3	.28	24	1.4	.65	.16	.1	.010L	w194009
w194010	19	2.9L	.9L	.32	46	3.3	.72	.45	.7	.010L	w194010
w194011	12	1.7L	.5L	.20	20L	2.5	1.0	1.5	.6	.010L	w194011
w194012	36	11L	3.6L	.69	290	15	2.5L	1.8L	1.8	.010	w194012
w194013	38	14L	4.5L	.79	370	18	3.1L	2.2L	2.0	.020	w194013
w194014	30	5.6L	1.8L	.45	140	8.8	1.2L	.88L	1.1	.12	w194014
w194015	31	4.5L	1.4L	.42	110	6.9	1.5	.84	.6	.020	w194015
w194016	16	2.0L	.7	.26	22	3.2	.70	.90	.5	.020	w194016
w194017	13	2.4L	1.0	.33	24	3.6	.99	1.1	.5	.010L	w194017
w194018	16	2.1	.7	.20	20L	4.0	1.4	1.2	.5	.010L	w194018
w194019	30	2.5L	1.1	.35	58	3.6	1.7	1.6	.4	.020	w194019
w194020	31	3.0L	1.0L	.36	60	4.5	1.5	1.8	.5	.020	w194020
w194021	23	2.0L	.6L	.38	32	2.3	.43L	1.3	.4	.010L	w194021
w194880	22	8.8L	4.0L	.57	1,400	10	2.8L	.80L	2.6	.080	w194880
w199324	16	1.1	.7	.24	20L	2.5	.99	1.8	1.2	.13	w199324
w199325	17	1.1	.9	.23	80	3.8	.83	2.4	.3	.010	w199325

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Ho-S (ppm)	In-S (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Sample number
w193983	0.32L	0.32L	7	6.4	0.1	21	0.64	0.78	2.1L	11	w193983
w193984	.36L	.36L	10	14	.1	7.8	1.0	1.5	6.2	10	w193984
w193985	.35L	.35L	9	13	.1	8.0	1.6	1.7	9.5	12	w193985
w193986	.38L	.38L	9	16	.1	8.6	.97	.86	3.9	14	w193986
w193987	.43L	.43L	10	11	.1	27	1.2	1.1	4.0	8.1	w193987
w193988	.64L	.64L	14	25	.1	7.4	.64	2.5	5.0	7.4	w193988
w193991	.21L	.21L	3	3.6	.1	3.0	1.3	.24	1.7	6.3	w193991
w193992	.20L	.20L	3	4.4	.1	3.5	1.5	.35	3.5	4.9	w193992
w193993	.65L	.65L	7	12	.2	12	1.4	.56	4.3L	10	w193993
w193994	.39L	.39L	4	7.7	.1	6.1	2.0	.55	3.8	7.7	w193994
w193995	.74L	.74L	11	20	.2	15	2.0	.32	6.0	16	w193995
w193996	.90L	.90L	11	30	.2	12	1.9	.65	5.9L	18	w193996
w193997	.71L	.71L	11	22	.1	8.5	1.9	.61	4.7L	14	w193997
w193998	1.4L	1.4L	16	26	.2	26	2.0	5.1	9.1L	11	w193998
w193999	.27L	.27L	4	6.1	.1	3.6	1.6	.30	1.7L	4.2	w193999
w194000	2.0L	2.0L	16	37	.2	42	2.5	5.4	13L	16	w194000
w194001	.67L	.67L	10	22	.1	18	2.2	1.7	4.4L	12	w194001
w194002	.44L	.44L	9	8.2	.1	16	1.6	.95	6.3	6.9	w194002
w194003	.67L	.67L	12	12	.2	8.8	1.9	1.2	4.4L	7.7	w194003
w194004	.34L	.24L	4	8.8	.1	4.8	1.2	.44	3.7	7.5	w194004
w194005	.22L	.22L	4	5.9	.1	3.4	1.3	.28	3.1	5.3	w194005
w194006	.22L	.22L	4	9.3	.1	4.7	1.1	.25	3.7	7.4	w194006
w194007	.33L	.23L	5	5.9	.1	13	1.8	.36	4.3	6.3	w194007
w194008	2.2L	.15L	3	3.7	.1	12	1.4	.24	2.6	4.6	w194008
w194009	.19L	.19L	5	5.4	.1	1.9	1.5	.41	1.2L	5.4	w194009
w194010	.63L	.63L	15	16	.1	11	.99	1.1	6.6	8.2	w194010
w194011	.38L	.38L	8	7.6	.1	31	.70	1.1	2.5L	8.6	w194011
w194012	2.5L	2.5L	27	75	.3	47	2.1	4.7	16L	17	w194012
w194013	3.1L	3.1L	31	85	.3	72	2.2	5.4	21L	18	w194013
w194014	1.2L	1.2L	19	48	.2	16	2.1	1.9	9.2	15	w194014
w194015	.98L	.98L	14	17	.2	22	3.9	1.5	7.8	20	w194015
w194016	.45L	.45L	7	17	.1	8.3	1.1	1.0	2.9L	13	w194016
w194017	.53L	.53L	9	21	.1	7.6	.76	1.3	5.7	11	w194017
w194018	.37L	.37L	6	14	.1	8.5	1.6	1.3	6.9	16	w194018
w194019	.55L	.55L	12	18	.1	15	2.4	1.1	12	18	w194019
w194020	.67L	.67L	9	21	.1	140	4.0	2.0	13	23	w194020
w194021	.43L	.43L	14	18	.2	4.7	1.8	.98	2.8L	12	w194021
w194880	2.8L	2.8L	27	68	.3	44	.80L	4.8	18L	10	w194880
w199324	32	.16L	2	9.4	.1	3.2	2.8	.30	3.2	12	w199324
w199325	.33	.18L	3	9.3	.2	1.6	.93	.63	2.8	13	w199325

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Virginia reported on whole-coal basis--continued

Sample number	P (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Re-S (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sample number
w193983	4	4.0	3.1L	B	0.46L	0.70	1.4	1.9	0.90	0.55	w193983
w193984	9	5.7	3.5L	B	.52L	.30	2.2	2.4	1.3	.47	w193984
w193985	20	4.0	3.4L	B	.50L	.20	1.7	2.2	1.1	.35L	w193985
w193986	12	6.5	3.7L	B	.54L	.40	2.0	1.9	1.2	.65	w193986
w193987	24	5.0	4.2L	B	.62L	.50	2.4	2.7	1.6	.62	w193987
w193988	60	6.9	6.2L	B	.91L	.60	3.3	2.4	1.8	.91	w193988
w193991	8	3.6	2.0L	B	.30L	2.1	1.4	1.1	.70	.27	w193991
w193992	11	2.4	2.0L	B	.29L	1.3	1.2	.9	.80	.20L	w193992
w193993	8	5.5	6.3L	B	.93L	1.6	3.1	1.5	1.6	.65L	w193993
w193994	14	3.4	3.7L	B	.55L	.50	1.5	.9	.90	.39L	w193994
w193995	42	7.7	7.2L	B	1.1L	.70	3.4	2.2	2.0	.74L	w193995
w193996	110	8.4	8.8L	B	1.3L	1.0	3.6	2.3	1.7	.90L	w193996
w193997	49	6.1	6.9L	B	1.0L	.90	3.2	3.4	1.9	.71L	w193997
w193998	17	11	13L	B	2.0L	.80	5.9	1.2	2.7	1.4L	w193998
w193999	7	2.6	2.6L	B	.38L	.50	1.1	.9	.80	.38	w193999
w194000	B	15	19L	76	2.8L	1.1	6.7	1.7	2.8	2.0L	w194000
w194001	160	4.8	6.5L	52L	.95L	1.3	2.9	.8	1.7	.95	w194001
w194002	47	4.8	4.3L	44L	.63L	.60	2.3	1.4	1.3	.63	w194002
w194003	180	6.4	6.5L	24	.96L	.80	3.3	1.8	1.9	.67L	w194003
w194004	15	3.4	2.3L	39L	.34L	.40	1.2	1.2	.90	.51	w194004
w194005	4	2.8	2.1L	35L	.31L	.30	.90	1.0	.80	.22L	w194005
w194006	14	2.8	2.1L	35L	.31L	.40	1.1	.9	1.0	.22L	w194006
w194007	59	3.3	2.2L	46L	.33L	.20	1.1	.6	1.1	.40	w194007
w194008	19	2.4	1.5L	32L	.22L	.20	.70	.7	.90	.26	w194008
w194009	76	2.2	1.8L	41L	.27L	.20	1.1	.6	1.3	.19L	w194009
w194010	20	5.3	6.1L	42L	.90L	.40	2.4	1.2	1.8	.63L	w194010
w194011	9	4.9	3.7L	49L	.54L	.60	1.6	2.4	1.0	.54	w194011
w194012	94	20	24L	100	3.6L	1.3	8.2	1.0	4.0	2.5L	w194012
w194013	98	22	31L	140	4.5L	1.2	9.9	1.0	4.6	3.1L	w194013
w194014	130	13	12L	42	1.8L	1.1	4.6	1.3	2.8	1.2L	w194014
w194015	61	9.5	9.5L	36	1.4L	1.7	3.4	1.4	2.4	.98L	w194015
w194016	17	7.0	4.4L	30L	.64L	.50	2.1	2.5	1.3	.45L	w194016
w194017	17	8.4	5.2L	27L	.76L	.50	2.5	1.8	1.7	.53L	w194017
w194018	9	4.9	3.6L	31L	.53L	.50	1.8	2.5	1.0	.37L	w194018
w194019	59	7.8	5.4L	15	.79L	1.4	2.3	2.2	2.0	.71	w194019
w194020	66	8.2	6.5L	17	.95L	.50	2.6	1.6	1.6	.67L	w194020
w194021	21	6.7	4.1L	100	.61L	.60	2.9	1.9	3.2	.55	w194021
w194880	18	14	27L	100	4.0L	.50	9.8	4.0	3.3	1.6	w194880
w199324	14	3.0	1.6L	25L	.23L	1.2	1.5	2.8	.90	.05L	w199324
w199325	20	2.8	1.7L	21L	.33	1.1	2.4	2.6	1.0	.20	w199325

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	Tm-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Sample number
w193983	60	0.2	3.0L	0.46L	0.23L	1.0	4.6	2.8	0.4	4.2	w193983
w193984	68	.2	3.0L	.52L	.26L	1.6	10	5.1	.5	4.0	w193984
w193985	85	.2	3.0L	.50L	.25L	1.1	10	5.5	.4	3.6	w193985
w193986	70	.2	3.0L	.54L	.27L	1.2	11	2.6	.5	3.6	w193986
w193987	68	.3	3.0L	.62L	.31L	1.5	11	4.2	.8	5.0	w193987
w193988	58	.3	3.0L	.91L	.46L	1.5	14	4.4	.9	7.7	w193988
w193991	24	.1	3.0L	.75	.15L	1.3	5.4	2.1	.5	8.4	w193991
w193992	35	.1	3.0L	.29L	.15L	1.3	5.8	3.2	.4	3.5	w193992
w193993	31	.3	3.0L	2.6	.47L	2.4	14	3.8	1.0	15	w193993
w193994	20	.1	3.0L	.61	.28L	1.5	9.9	3.6	.4	4.7	w193994
w193995	35	.3	19	1.1L	.53L	1.8	19	3.2	.9	10	w193995
w193996	50	.3	3.0L	1.5	.65L	3.3	25	2.5	.8	19	w193996
w193997	43	.3	3.0L	2.8	.51L	2.2	18	2.8	.8	18	w193997
w193998	51	.4	3.0	2.0L	.99L	2.9	35	6.3	1.2	32	w193998
w193999	27	.2	3.0L	.38L	.19L	.90	5.7	1.1	.4	3.6	w193999
w194000	71	.4	7.0	2.8L	1.4L	3.9	51	7.4	1.2	31	w194000
w194001	85	.3	3.0L	.95L	.48L	1.3	16	5.6	.8	11	w194001
w194002	42	.2	3.0L	.63L	.32L	1.6	14	4.2	.5	3.6	w194002
w194003	71	.2	6.0	.96L	.48L	1.8	16	2.9	.8	9.6	w194003
w194004	29	.2	3.0L	.34L	.17L	3.0	7.8	2.4	.4	3.2	w194004
w194005	30	.1	3.0L	.74	.16L	1.1	5.0	2.0	.3L	2.4	w194005
w194006	30	.2	3.0L	.31L	.16L	1.1	7.8	3.1	.4	2.7	w194006
w194007	50	.2	3.0L	.33L	.17L	1.4	7.3	3.2	.5	4.6	w194007
w194008	26	.2	3.0L	.22L	.11L	.70	4.0	2.2	.3	2.9	w194008
w194009	51	.2	3.0L	.27L	.14L	1.4	6.2	2.2	.6	3.8	w194009
w194010	57	.3	3.0L	.90L	.45L	1.0	13	5.6	.8	3.4	w194010
w194011	51	.2	3.0L	.54L	.27L	1.0	4.6	3.7	.4	11	w194011
w194012	82	.5	9.0	3.6L	1.8L	3.9	54	6.1	1.6	35	w194012
w194013	76	.6	8.0	4.5L	2.2L	4.6	58	9.0	1.9	43	w194013
w194014	63	.4	3.0L	1.8L	.88L	3.7	28	5.5	1.1	18	w194014
w194015	53	.3	3.0	1.7	.70L	3.9	28	6.2	.9	43	w194015
w194016	23	.2	3.0L	.64L	.32L	1.2	10	3.8	.6	16	w194016
w194017	27	.3	3.0L	.76L	.38L	1.4	14	6.2	.8	17	w194017
w194018	31	.2	7.0	.53L	.27L	.80	11	6.4	.5	11	w194018
w194019	51	.3	3.0L	1.1	.40L	2.3	18	7.9	.7	41	w194019
w194020	44	.2	3.0L	1.0	.48L	2.1	22	8.6	.6	44	w194020
w194021	20	.3	3.0L	.61L	.31L	2.4	10	1.5	.9	3.9	w194021
w194880	92	.5	5.0	1.2L	2.0L	2.8	52	10	1.4	30	w194880
w199324	83	.2	3.0L	.74	.12L	1.1	9.2	6.9	.8	6.4	w199324
w199325	82	.2	3.0L	.08L	.13L	1.4	11	7.5	1.0	9.3	w199325

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Zr-S (ppm)
w193983	11
w193984	16
w193985	19
w193986	5.9
w193987	9.9
w193988	35
w193991	2.0
w193992	2.6
w193993	4.1
w193994	6.6
w193995	5.6
w193996	8.0
w193997	5.5
w193998	45
w193999	2.8
w194000	37
w194001	21
w194002	6.9
w194003	12
w194004	2.6
w194005	2.2
w194006	3.4
w194007	2.6
w194008	1.6
w194009	1.9
w194010	8.6
w194011	12
w194012	23
w194013	25
w194014	13
w194015	8.5
w194016	7.0
w194017	8.4
w194018	13
w194019	7.9
w194020	12
w194021	5.4
w194880	44
w199324	2.8
w199325	4.8

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w199326	1.5	1.4	0.087	0.036	0.020	0.16	0.17	0.036	0.01	1.0	w199326
w199327	.88	.72	.11	.014	.010	.009	1.4	.033	.01	42	w199327
w199328	.67	.59	.13	.020	.010	.009	.17	.033	.04	1.0	w199328
w199329	.82	.68	.081	.013	.010	.028	2.9	.030	.05	73	w199329
w199330	1.5	1.3	.052	.010	.010	.012	3.2	.024	.02	120	w199330
w199331	4.6	2.6	.073	.098	.040	.52	.32	.13	.05	1.0	w199331
w199332	.97	.88	.053	.013	.010	.022	.092	.014	.03	1.0	w199332
w199000	1.6	1.3	.046	.020	.060	.079	.25	.041	.14	3.0	w199000
w199001	1.5	1.2	.046	.022	.070	.071	.27	.038	.01L	5.0	w199001
w199002	2.0	1.4	.068	.052	.020	.21	.43	.073	.04	20	w199002
w199003	1.7	1.3	.040	.035	.040	.15	.25	.056	.03	3.0	w199003
w199004	2.1	1.9	.42	.14	.020	.20	.98	.046	.04	14	w199004
w199005	.84	.59	.064	.016	.020	.031	.57	.033	.04	16	w199005
w199006	1.6	1.4	.068	.034	.020	.12	1.1	.044	.03	11	w199006
w199007	1.5	1.2	.13	.031	.050	.12	.38	.043	.04	10	w199007
w199008	3.5	2.9	.090	.056	.039	.19	.38	.14	.11	3.0	w199008
w199009	4.0	3.1	.072	.066	.039	.21	.39	.16	.10	34	w199009
w199010	3.4	2.6	.25	.086	.030	.23	.63	.13	.09	1.0	w199010
w199011	2.4	1.7	.19	.053	.030	.28	1.4	.065	.02	3.0	w199011
w199012	1.3	1.1	.10	.039	.030	.16	.71	.037	.03	7.0	w199012
w199013	1.6	.95	.57	.063	.020	.095	1.2	.042	.01L	3.0	w199013
w199014	1.3	2.1	.12	.026	.030	.10	.72	.033	.07	27	w199014
w199015	1.1	1.0	.17	.039	.030	.069	.15	.028	.02	2.0	w199015
w199016	1.7	1.5	.30	.062	.040	.098	.19	.049	.02	5.0	w199016
w199017	1.4	1.2	.25	.039	.020	.082	.16	.042	.04	11	w199017
w199018	2.1	1.7	.62	.14	.030	.20	1.2	.059	.01L	6.0	w199018
w199019	.59	.43	.075	.007	.030	.024	.59	.018	.02	21	w199019
w199020	11	7.9	.079	.31	.070	1.4	.90	.31	.30	6.0	w199020
w199021	6.4	4.1	.10	.13	.050	.76	1.1	.19	.13	5.0	w199021
w199022	1.8	1.4	.055	.047	.050	.18	.83	.048	.05	14	w199022
w199023	1.2	1.1	.055	.028	.050	.11	.39	.032	.05	5.0	w199023
w199024	1.3	1.0	.055	.034	.030	.12	1.1	.055	.03	12	w199024
w198544	2.4	2.1	.066	.037	.010	.19	.53	.12	.04	7.0	w198544
w198545	4.4	3.1	.067	.056	.020	.31	1.1	.30	.06	21	w198545
w198546	3.4	1.9	.065	.032	.030	.25	.81	.17	.04	19	w198546
w198547	4.4	2.0	.054	.025	.010	.073	.19	.23	.03	1.0	w198547
w198548	2.6	2.6	.19	.046	.030	.17	.42	.19	.03	1.0	w198548
w199418	4.3	3.0	.29	.054	.040	.39	.32	.20	.03	2.0	w199418
w199419	3.3	2.0	.17	.020	.020	.16	.17	.16	.04	2.0	w199419
w199420	2.8	1.9	.071	.017	.010	.11	.70	.19	.03	10	w199420

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Au-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Bi-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w199326	0.7L	34	29	2.9	1.0L	0.03	16	14	12	0.5	w199326
w199327	.6L	19	21	3.4	.9L	.08	18	5.6	6.6	.6L	w199327
w199328	.3L	34	27	1.7	.5L	.05	11	14	7.3	.6L	w199328
w199329	.8L	24	210	1.5	1.1L	.14	11	24	7.1	.7L	w199329
w199330	1.1L	18	240	3.1	1.7L	.66	16	90	14	.8L	w199330
w199331	1.7L	36	110	3.6	2.6L	.14	31	15	27	2.1	w199331
w199332	.4L	31	12	1.5	.7L	.08	5.0	15	10	.5L	w199332
w199000	.7L	14	57	1.6	1.0L	.13	23	6.0	13	.3	w199000
w199001	.7L	12	52	1.6	1.0L	.11	26	6.1	11	.3	w199001
w199002	.9L	7.6	64	1.8	1.3L	.10	24	4.4	18	1.3	w199002
w199003	.7L	5.0	48	1.9	1.1L	.06	35	16	22	1.3	w199003
w199004	1.3L	5.3	140	3.4	1.9L	.30	41	4.9	22	1.1	w199004
w199005	.4L	7.7	20	1.7	.6L	.05	11	4.3	5.7	.3	w199005
w199006	.9L	8.3	34	1.9	1.3L	.09	17	5.3	17	1.0	w199006
w199007	.7L	9.4	79	1.3	1.1L	.09	15	18	12	.5	w199007
w199008	1.5L	17	140	2.4	2.3L	.18	46	18	26	1.2	w199008
w199009	1.7L	13	86	2.3	2.5L	.13	51	14	28	1.4	w199009
w199010	1.5L	11	130	1.5	2.3L	.17	44	7.9	25	1.6	w199010
w199011	1.2L	9.4	110	1.8	1.8L	.18	24	3.6	13	1.0	w199011
w199012	.7L	8.2	75	1.2	1.0L	.06	13	3.0	11	.6	w199012
w199013	1.0L	2.9	150	1.5	1.4L	.23	31	7.2	13	.4	w199013
w199014	.9L	3.0	130	2.7	1.4L	1.1	72	9.3	25	.7	w199014
w199015	.6L	5.0	110	1.4	.8L	.10	30	16	12	.4	w199015
w199016	.8L	4.3	110	1.7	1.3L	.17	35	12	16	.5	w199016
w199017	.7L	3.8	130	1.7	1.1L	.11	32	14	18	.4	w199017
w199018	1.3L	6.2	180	1.1	1.9L	.19	21	11	17	1.0	w199018
w199019	.3L	2.3	27	1.8	.5L	.03	10	9.2	8.3	.8L	w199019
w199020	4.3L	32	190	4.3	6.4L	.19	110	8.6	84	4.9	w199020
w199021	2.6L	16	570	10	3.9L	3.1	57	8.0	36	2.7	w199021
w199022	.9L	11	63	1.4	1.3L	.14	31	16	21	1.5	w199022
w199023	.6L	10	56	1.3	.9L	.09	18	13	10	.5	w199023
w199024	.7L	9.1	37	1.5	1.1L	.11	18	3.4	13	.7	w199024
w198544	1.1L	21	29	1.3	1.6L	.06	20	15	23	.8	w198544
w198545	1.8L	31	57	3.5	2.8L	.07	42	8.4	36	1.4	w198545
w198546	1.3L	130G	45	2.9	2.0L	.02	30	2.5	23	.7	w198546
w198547	1.5L	20	29	1.9	2.2L	.03	35	6.6	26	1.1L	w198547
w198548	1.3L	27	59	1.7	1.9L	.09	37	5.2	28	.9	w198548
w199418	1.7L	30	100	2.2	2.5L	.08	35	6.3	31	1.3	w199418
w199419	1.2L	27	53	1.8	1.8L	.07	25	5.6	24	.6	w199419
w199420	1.2L	23	29	5.8	1.7L	.07	22	11	26	.5	w199420

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	Sample number
w199326	16	1.5L	0.7	0.40	88	4.7	0.88	0.20	0.5	0.010L	w199326
w199327	11	1.3L	.6L	.27	84	3.7	.91	1.0	.4	.010	w199327
w199328	15	1.1	.5	.25	80	3.7	.75	1.0	.3	.010	w199328
w199329	7.6	1.7L	.8L	.20	32	6.2	1.6	2.0	.2	.39	w199329
w199330	11	2.4L	1.1L	.32	130	6.4	1.7	12	.3	.60	w199330
w199331	27	3.7L	2.4	.65	320	7.7	2.9	.34	1.1	.040	w199331
w199332	22	1.7	1.1	.27	20L	3.1	1.1	1.1	.4	.010L	w199332
w199000	50	1.5L	1.0	.51	350	3.4	1.8	1.9	.4	.040	w199000
w199001	48	2.1	.9	.58	250	3.0	1.6	3.0	.5	.040	w199001
w199002	32	1.9L	.9L	.60	150	5.2	1.4	.52	.7	.11	w199002
w199003	16	1.7	.9	.58	360	4.6	1.0	1.9	.8	.080	w199003
w199004	36	3.4	1.3L	.94	170	3.4	3.6	.25L	.5	.15	w199004
w199005	14	.9L	.4L	.25	150	4.2	.77	.99	.4	.16	w199005
w199006	39	2.1	.9	.47	91	6.7	1.3	2.4	.5	.050	w199006
w199007	24	1.6L	.7L	.30	120	3.8	.79	1.7	.3	.040	w199007
w199008	38	3.3L	1.5L	.93	120	10	2.3	1.2	1.3	.16	w199008
w199009	37	3.7L	2.2	.89	240	6.5	2.8	.33L	1.3	.13	w199009
w199010	38	3.3L	1.5L	.77	210	5.1	2.4	.30L	1.3	.060	w199010
w199011	73	2.7L	1.2L	.52	130	6.1	1.5	1.7	.5	.080	w199011
w199012	47	2.0	.7L	.35	35	4.0	1.0	1.4	.3	.12	w199012
w199013	17	2.1L	1.0L	.59	27	2.9	1.8	.57	.5	.080	w199013
w199014	31	3.2	2.0	2.6	20L	7.2	3.8	3.0	.5	.11	w199014
w199015	17	1.8	.9	.43	39	7.7	1.5	6.6	.3	.080	w199015
w199016	21	1.8L	.8L	.54	20L	9.2	1.7	7.7	.6	.080	w199016
w199017	20	1.5L	.7L	.49	20L	11	1.1	9.1	.6	.080	w199017
w199018	32	2.8L	1.3L	.45	160	5.2	1.8	1.0	.6	.27	w199018
w199019	7.1	1.1	.7	.36	170	4.1	.82	2.2	.4L	.23	w199019
w199020	160	9.4L	4.3L	2.1	390	23	5.1	.85L	2.4	.14	w199020
w199021	75	9.6	4.9	3.1	120	9.3	11	.52L	1.2	.10	w199021
w199022	34	1.9L	.9L	.58	230	5.1	1.4	2.5	.6	.17	w199022
w199023	35	1.8	.9	.37	20L	4.7	1.4	2.4	.3	.070	w199023
w199024	21	1.5L	.7L	.28	39	5.2	1.1	1.2	.6	.040	w199024
w198544	16	2.4L	1.1L	.36	230	7.7	1.1	.21	1.0	.19	w198544
w198545	26	4.0L	1.8L	.67	84	13	2.0	1.1	2.5	.49	w198545
w198546	14	2.9L	1.3L	.45	68	6.9	1.6	.26	1.7	.36	w198546
w198547	23	3.2L	1.5L	.60	52	5.5	1.3	.29L	2.0	.080	w198547
w198548	18	2.8L	1.3L	.71	260	8.1	1.7	.26L	1.7	.070	w198548
w199418	17	3.7L	1.7	.57	280	9.5	2.4	.34	1.6	.030	w199418
w199419	17	2.7L	1.2L	.40	160	5.2	1.4	.49	1.3	.020	w199419
w199420	20	2.5L	1.2L	.38	68	7.2	1.4	1.7	1.5	.13	w199420

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Ho-S (ppm)	In-S (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Sample number
w199326	0.48L	0.48L	6	29	0.1	6.1	1.2	0.48	6.5	12	w199326
w199327	.40L	.40L	9	10	.1	9.1	.91	.46	4.7	25	w199327
w199328	.24L	.24L	5	7.8	.1	9.9	.88	.61	2.9	21	w199328
w199329	.53L	.53L	5	7.4	.1	5.0	1.3	1.1	4.9	26	w199329
w199330	.77L	.77L	6	15	.1	5.6	7.6	.55	6.3	110	w199330
w199331	1.2L	1.2L	14	26	.3	14	1.7	2.2	22	26	w199331
w199332	.35	.31L	2	13	.1	2.2	4.8	.62	5.3	23	w199332
w199000	.48L	.48L	14	10	.1	2.7	1.2	.61	13	7.5	w199000
w199001	.46L	.46L	15	9.2	.1	3.6	1.3	.46	12	7.9	w199001
w199002	.61L	.61L	13	12	.2	75	4.8	1.0	10	15	w199002
w199003	.50L	.50L	20	15	.2	17	1.1	.86	9.4	10	w199003
w199004	1.9L	.89L	25	9.7	.3	300	1.1	.38	14	22	w199004
w199005	.30L	.30L	6	4.1	.1	5.6	3.1	.65	4.7	6.5	w199005
w199006	.60L	.60L	8	8.5	.2	17	4.4	.77	9.5	8.4	w199006
w199007	.50L	.50L	9	14	.1	10	2.8	.29	6.0	11	w199007
w199008	1.1L	1.1L	27	38	.3	46	5.8	2.0	18	23	w199008
w199009	1.2L	1.2L	29	53	.3	9.8	5.3	4.0	22	20	w199009
w199010	1.1L	1.1L	24	36	.2	200	3.2	2.6	21	14	w199010
w199011	.85L	.85L	13	10	.1	280	5.4	.61	13	16	w199011
w199012	.48L	.48L	7	5.7	.1	58	6.8	.48	10	10	w199012
w199013	1.4L	.67L	14	6.4	.1	320	2.0	.48	9.5	17	w199013
w199014	.74	.65L	38	5.8	.6	25	.37	.19	21	35	w199014
w199015	.39L	.39L	19	5.5	.1	12	2.0	.44	12	19	w199015
w199016	.59L	.59L	21	17	.1	61	.84	.67	9.2	25	w199016
w199017	.49L	.49L	16	8.4	.1	53	1.3	.42	9.8	15	w199017
w199018	.89L	.89L	11	12	.1	1,400	1.1	.51	7.1	17	w199018
w199019	.37	.24L	4	1.1	.2	5.1	2.0	.34	3.4	10	w199019
w199020	3.0L	3.0L	58	140	.5	56	.85L	3.0	47	29	w199020
w199021	2.1	1.8L	41	24	.7	62	1.6	3.6	60	130	w199021
w199022	.60L	.60L	18	14	.2	18	3.6	.60	10	20	w199022
w199023	.41L	.41L	10	10	.1	8.3	3.7	.47	10	21	w199023
w199024	.49L	.49L	10	6.0	.1	13	1.7	.70	6.8	5.5	w199024
w198544	.75L	.75L	11	27	.1	4.9	1.9	2.1	7.6	33	w198544
w198545	1.3L	1.3L	21	35	.3	12	2.9	5.5	10	17	w198545
w198546	.92L	.92L	16	16	.2	3.7	.92	3.5	11	5.4	w198546
w198547	1.0L	1.0L	18	31	.2	8.9	1.0	4.8	8.8	16	w198547
w198548	.90L	.90L	19	38	.2	5.1	1.2	2.9	12	11	w198548
w199418	1.2L	1.2L	22	37	.2	10	1.0	4.2	9.0	16	w199418
w199419	.86L	.86L	15	15	.1	8.2	.74	3.4	11	11	w199419
w199420	.81L	.81L	13	16	.2	9.8	1.3	3.5	8.1	15	w199420

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	P (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Re-S (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sample number
w199326	18	5.2	4.6L	23L	0.68L	0.50	3.1	3.5	1.6	0.34	w199326
w199327	12	2.1	3.9L	22L	.57L	.40	1.5	5.6	1.3	.11L	w199327
w199328	36	5.4	2.3L	19L	.34L	.30	2.1	3.1	1.1	.20	w199328
w199329	20	1.9	5.2L	23L	.76L	.90	1.9	3.6	.90	N	w199329
w199330	10	13	7.5L	26L	1.1L	2.9	2.5	11	1.4	.22L	w199330
w199331	37	13	12L	33	1.7L	.60	5.8	6.7	3.0	1.2	w199331
w199332	12	5.7	3.0L	15L	.44L	.60	3.0	5.6	1.0	.26	w199332
w199000	39	8.8	4.6L	75L	.68L	1.0	3.7	4.2	2.4	.27	w199000
w199001	35	9.9	4.5L	61L	.66L	1.4	3.7	4.9	2.8	.20	w199001
w199002	87	9.6	5.9L	49L	.87L	1.8	4.5	2.0	2.5	.35	w199002
w199003	69	5.5	4.9L	52L	.72L	1.4	6.6	1.8	2.9	.50	w199003
w199004	280	6.6	8.6L	58L	1.3L	.80	3.9	2.4L	4.4	.25L	w199004
w199005	75	3.4	2.9L	42L	.43L	.60	1.9	2.9	1.1	.13	w199005
w199006	190	5.2	5.8L	48L	.86L	2.1	4.0	4.0	2.2	.17L	w199006
w199007	530	4.2	4.9L	57L	.72L	1.8	2.8	2.1	1.6	.14L	w199007
w199008	430	10	10L	62L	1.5L	.60	6.4	3.1	4.5	1.4	w199008
w199009	200	11	11L	51L	1.7L	.80	6.3	3.6	4.6	1.0	w199009
w199010	260	8.8	10L	55L	1.5L	.40	5.6	2.1	3.8	.60	w199010
w199011	150	9.9	8.2L	45L	1.2L	2.3	3.2	1.7	2.4	.24L	w199011
w199012	68	6.4	4.6L	45L	.68L	2.4	2.6	2.7	1.6	.14L	w199012
w199013	190	4.0	6.5L	40L	.95L	.50	2.7	1.4	3.0	.19L	w199013
w199014	93	5.7	6.3L	62L	.93L	1.2	11	3.5L	13	.19L	w199014
w199015	240	4.3	3.7L	49L	.55L	1.0	3.7	1.5	2.3	.33	w199015
w199016	92	6.6	5.7L	50L	.84L	2.3	5.8	1.7	2.9	.42	w199016
w199017	76	6.0	4.8L	41L	.70L	2.6	4.8	2.0	2.6	.14L	w199017
w199018	140	4.6	8.6L	43L	1.3L	1.6	3.8	1.9	2.0	.25L	w199018
w199019	12	2.0	2.3L	39L	.34L	2.2	2.4	2.0	1.6	.07L	w199019
w199020	170	56	29L	84	4.3L	2.8	27	9.6	10	2.6	w199020
w199021	170	18	18L	37	2.6L	2.2	10	2.1	14	.52L	w199021
w199022	150	7.5	5.8L	48L	.85L	3.1	4.8	2.6	2.9	.17L	w199022
w199023	110	5.9	4.0L	42L	.59L	2.5	3.1	2.1	1.9	.12	w199023
w199024	140	3.6	4.8L	37L	.70L	1.3	2.9	3.3	1.5	.14L	w199024
w198544	28	8.6	7.3L	28L	1.1L	.30	4.7	7.0	1.7	.64	w198544
w198545	48	16	13L	20	1.8L	.80	8.0	12	3.2	1.7	w198545
w198546	560	6.0	8.9L	36L	1.3L	1.0	5.2	5.8	2.2	.79	w198546
w198547	70	12	9.9L	30L	1.5L	.40	6.3	13	2.6	1.2	w198547
w198548	62	9.0	8.7L	38L	1.3L	.50	7.8	6.8	3.1	1.5	w198548
w199418	740	11	11L	30	1.7L	.50	6.6	4.6	2.7	1.2	w199418
w199419	32	10	8.4L	41L	1.2L	.50	4.5	5.7	1.9	.86	w199419
w199420	40	9.1	7.8L	39L	1.2L	.50	4.9	6.4	1.8	.81	w199420

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Virginia reported on whole-coal basis--continued

Sample number	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	Tm-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Sample number
w199326	51	0.3	3.0L	0.20L	0.34L	1.3	22	6.7	0.8	4.4	w199326
w199327	39	.2	3.0L	8.0	.29L	.80	4.7	3.1	.4	4.1	w199327
w199328	110	.2	3.0L	.10L	.17L	.90	7.8	5.1	.6	3.4	w199328
w199329	42	.5L	3.0L	8.4	.38L	1.0	6.5	4.9	.5	47	w199329
w199330	20	.6L	3.0L	13	.55L	1.3	9.5	5.2	.5	240	w199330
w199331	66	.6	3.0L	.58	.85L	2.5	49	19	2.0	65	w199331
w199332	33	.3	3.0L	.13L	.22L	1.1	22	8.4	.8	25	w199332
w199000	52	.3	3.0L	.48	.34L	1.6	31	8.2	.9	7.5	w199000
w199001	42	.4	3.0L	.40	.33L	2.0	32	7.9	1.0	6.6	w199001
w199002	56	.4	3.0L	.61	.44L	2.6	34	7.1	1.1	15	w199002
w199003	38	.4	3.0L	.22L	.36L	2.0	21	6.0	1.3	6.8	w199003
w199004	64	.7	3.0L	.38L	.64L	2.4	19	20	2.3	48	w199004
w199005	52	.2	3.0L	1.2	.22L	1.0	10	4.2	.6	3.3	w199005
w199006	51	.3	3.0L	.26L	.43L	2.1	32	8.3	1.2	14	w199006
w199007	120	.2	3.0L	.29	.36L	1.6	17	3.7	.7	7.9	w199007
w199008	180	.6	3.0L	.46L	.76L	2.3	44	11	1.9	24	w199008
w199009	100	.7	3.0L	.50L	.83L	2.4	43	16	1.9	13	w199009
w199010	140	.6	3.0L	.45L	.76L	2.1	39	13	1.6	13	w199010
w199011	76	.3	3.0L	.36L	.61L	2.3	40	7.6	.9	45	w199011
w199012	61	.2	3.0L	.68L	.34L	2.0	35	7.5	.7	11	w199012
w199013	69	.5	3.0L	.29L	.48L	1.5	11	8.7	1.1	29	w199013
w199014	20	2	3.0L	.28L	.47L	2.2	13	17	4.3	36	w199014
w199015	170	.2	3.0L	.17L	.28L	1.6	20	8.3	.7	15	w199015
w199016	55	.4	3.0L	.25L	.42L	1.6	21	7.1	.9	17	w199016
w199017	220	.3	3.0L	.21	.35L	2.3	29	4.6	.7	21	w199017
w199018	95	.2	3.0L	.38L	.64L	1.8	18	6.7	.8	25	w199018
w199019	37	.3	3.0L	.99	.17L	1.1	12	6.5	1.1	3.1	w199019
w199020	77	1	22	1.3L	2.1L	7.7	120	29	3.6	41	w199020
w199021	100	2	6.0	.78L	1.3L	4.1	54	41	4.8	88	w199021
w199022	73	.3	3.0L	.85	.43L	2.5	32	7.4	1.1	8.3	w199022
w199023	71	.3	3.0L	.18L	.30L	2.0	33	6.5	.8	5.0	w199023
w199024	45	.3	3.0L	.21L	.35L	1.5	17	5.1	.8	5.4	w199024
w198544	44	.4	5.0	1.5	.54L	1.1	26	4.9	.7	25	w198544
w198545	52	.6	6.0	4.4	.92L	2.4	35	8.5	1.7	14	w198545
w198546	56	.8L	8.0	3.0	.66L	1.9	30	5.9	1.0	4.8	w198546
w198547	51	.6	8.0	.44L	.73L	1.4	19	5.8	1.3	4.5	w198547
w198548	400	.6	7.0	.38L	.64L	1.4	29	6.1	1.1	12	w198548
w199418	250	.4	6.0	.51L	.85L	1.1	37	12	1.3	12	w199418
w199419	84	.3	6.0	.37L	.62L	.90	22	7.0	.9	8.2	w199419
w199420	53	.3	6.0	1.0	.58L	.90	23	8.4	1.4	3.8	w199420

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Zr-S (ppm)
w199326	8.8
w199327	6.3
w199328	6.1
w199329	7.4
w199330	5.9
w199331	22
w199332	6.6
w199000	9.5
w199001	7.9
w199002	8.7
w199003	11
w199004	11
w199005	6.9
w199006	11
w199007	4.8
w199008	18
w199009	35
w199010	24
w199011	8.3
w199012	6.8
w199013	10
w199014	8.1
w199015	7.7
w199016	10
w199017	7.7
w199018	9.5
w199019	3.4
w199020	37
w199021	31
w199022	10
w199023	8.3
w199024	9.8
w198544	13
w198545	44
w198546	25
w198547	29
w198548	17
w199418	35
w199419	30
w199420	22

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w199421	1.6	0.91	0.069	0.017	0.010	0.056	0.87	0.058	0.01L	18	w199421
w199422	1.5	.91	.37	.045	.050	.089	1.3	.049	.01L	7.0	w199422
w199425	3.5	2.3	.060	.041	.020	.25	.36	.21	.03	3.0	w199425
w195104	2.4	1.2	.056	.039	.025	.19	.40	.071	.01L	2.0	w195104
w195105	2.2	1.2	.083	.069	.030	.25	.61	.052	.04	3.0	w195105
w195106	2.0	1.1	.045	.062	.025	.16	.42	.069	.01L	1.0	w195106
w195107	1.5	1.0	.058	.035	.030	.084	.29	.057	.02	1.0	w195107
w195108	2.3	1.5	.054	.090	.040	.25	.63	.072	.03	23	w195108
w195109	B	B	B	.052	.030	B	B	B	.02	6.0	w195109
w195110	2.6	1.4	.096	.095	.040	.35	1.4	.061	.02	27	w195110
w195131	2.7	1.7	.079	.066	.060	.15	.36	.086	.02	9.0	w195131
w195132	2.1	1.5	.055	.051	.050	.10	.27	.040	.03	3.0	w195132
w201530	7.4	6.2	.055	.095	.039	.52	.72	.35	.06	7.0	w201530
w201531	4.1	3.5	.053	.049	.020	.18	1.0	.11	.11	9.0	w201531
w201532	6.7	4.0	.054	.13	.041	.61	1.1	.19	.05	25	w201532
w201533	1.5	1.1	.38	.11	.030	.16	1.1	.052	.02	49	w201533
w201534	.65	.53	.048	.010	.010	.029	1.3	.015	.06	34	w201534
w194951	1.2	.87	.080	.048	.010	.094	1.3	.043	.01L	53	w194951
w194952	3.1	2.5	.36	.080	.030	.32	1.1	.11	.06	14	w194952
w194953	7.1	4.0	.14	.18	.061	.68	.99	.34	.03	4.0	w194953
w194954	2.5	1.6	.33	.068	.020	.20	2.2	.11	.09	34	w194954
w194955	2.5	1.8	.10	.035	.020	.13	1.6	.15	.03	16	w194955
w194956	3.5	2.6	.070	.031	.009	.15	.26	.19	.03	1.0	w194956
w194957	4.1	3.5	.076	.085	.030	.44	.34	.23	.02	1.0	w194957
w194958	1.3	.73	.12	.027	.040	.069	.96	.050	.01	5.0	w194958
w194959	1.2	.67	.090	.029	.020	.11	2.1	.043	.02	9.0	w194959
w194960	1.3	.81	.11	.026	.030	.071	1.7	.056	.01L	13	w194960
w194961	1.8	1.1	.15	.044	.020	.14	1.3	.075	.01L	8.0	w194961
w194962	1.4	.83	.12	.034	.010	.12	.62	.053	.01	9.0	w194962
w194963	1.2	.85	.33	.049	.055	.065	2.3	.054	.01L	15	w194963
w194964	1.8	1.1	.12	.047	.020	.14	1.6	.059	.01L	8.0	w194964
w194965	1.3	.81	.12	.030	.040	.083	1.3	.051	.02	6.0	w194965
w194966	1.7	.74	1.8	.058	.020	.15	1.2	.038	.01L	5.0	w194966
w194967	2.5	1.7	.35	.056	.029	.21	1.9	.094	.01L	7.0	w194967
w194968	1.4	.72	.097	.027	.020	.081	.68	.058	.01	4.0	w194968
w194969	1.5	.82	.50	.046	.050	.079	.90	.057	.01L	3.0	w194969
w194970	1.4	.99	.091	.024	.010	.094	1.2	.040	.02	18	w194970
w194971	3.0	1.3	.31	.064	.030	.28	2.0	.077	.01L	30	w194971
w194972	1.2	.79	.13	.031	.010	.092	.77	.051	.01	4.0	w194972
w194973	1.5	.87	.085	.021	.030	.094	.29	.057	.01	7.0	w194973

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Virginia reported on whole-coal basis--continued

Sample number	Au-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Bi-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w199421	0.7L	26	31	0.8	1.0L	0.02	9.0	1.5	9.7	0.2	w199421
w199422	.8L	41	50	.5	1.2L	.06	9.0	2.4	10	.5	w199422
w199425	1.3L	26	40	1.5	2.0L	.04	27	5.1	25	1.1	w199425
w195104	.9L	4.3	69	1.6	1.4L	.04	18	9.0	12	1.2	w195104
w195105	.9L	4.4	85	1.7	1.3L	.13	19	14	9.9	2.0	w195105
w195106	.8L	4.1	80	1.1	1.2L	.04	18	8.1	11	1.5	w195106
w195107	.6L	4.8	58	.7	.9L	.03	13	2.9	8.5	.6	w195107
w195108	1.0L	6.6	62	1.4	1.5L	.32	22	11	13	2.4	w195108
w195109	.4L	3.1	60	1.2	.5L	.07	8.0	3.2	3.1	.2	w195109
w195110	1.2L	6.2	120	1.3	1.8L	.07	17	4.1	13	1.7	w195110
w195131	1.1L	4.6	60	1.6	1.7L	.02	36	6.8	16	.8	w195131
w195132	.9L	4.1	47	1.4	1.3L	.06	33	5.2	12	1.0	w195132
w201530	3.1L	43	110	5.3	4.7L	.11	44	12	63	1.9	w201530
w201531	1.8L	35	89	2.4	2.7L	.14	27	9.2	27	1.4	w201531
w201532	2.6L	50	110	1.8	3.9L	.08	48	6.2	41	3.3	w201532
w201533	.9L	10	77	2.3	1.4L	.11	13	3.4	12	.9	w201533
w201534	.5L	24	16	2.7	.7L	.06	13	28	9.1	.2	w201534
w194951	.8L	14	220	1.1	1.1L	.08	10	13	9.8	.5	w194951
w194952	1.6L	20	59	1.6	2.3L	.09	27	7.0	23	1.3	w194952
w194953	2.8L	31	110	2.3	4.2L	.08	39	8.0	45	3.1	w194953
w194954	1.4L	14	28	.9	2.1L	.09	18	4.1	18	.9	w194954
w194955	1.3L	10	28	1.7	1.9L	.09	23	10	23	.5	w194955
w194956	1.4L	23	36	1.7	2.1L	.10	28	7.9	29	.7	w194956
w194957	1.8L	27	81	1.8	2.7L	.06	30	5.3	33	1.9	w194957
w194958	.7L	48	76	.8	1.0L	.03	7.0	2.6	9.1	.3	w194958
w194959	.8L	26	45	.8	1.3	.09	7.0	2.3	9.1	.6	w194959
w194960	.9L	27	59	.8	1.3L	.07	9.0	1.8	12	.4	w194960
w194961	1.0L	21	68	.9	1.4L	.09	10	2.1	12	.8	w194961
w194962	.7L	23	68	.8	1.0L	.06	8.0	3.0	8.9	.5	w194962
w194963	1.0L	37	89	.3	1.5L	.08	9.0	4.3	8.9	.3	w194963
w194964	1.0L	24	58	1.1	1.5L	.05	10	2.9	11	.8	w194964
w194965	.8L	28	74	.5	1.2L	.04	8.0	1.4	9.3	.4	w194965
w194966	1.3L	20	44	1.1	1.9L	.05	7.0	1.9	7.6	.6	w194966
w194967	1.4L	27	140	1.1	2.1L	.06	17	3.6	17	.9	w194967
w194968	.7L	26	85	.7	1.0L	.03	9.0	1.5	11	.4	w194968
w194969	.9L	34	81	.4	1.3L	.06	9.0	1.8	10	.4	w194969
w194970	.8L	12	32	1.1	2.4L	.05	10	2.3	9.5	.6	w194970
w194971	1.5L	18	57	1.2	2.2L	.10	15	5.1	15	1.2	w194971
w194972	.7L	18	32	.5	1.0L	.05	7.0	1.6	8.4	.5	w194972
w194973	.6L	25	88	.9	.9L	.04	8.0	2.0	9.5	.6	w194973

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	Sample number
w199421	6.6	1.5L	0.7L	0.16	52	2.8	0.48L	2.4	0.6	0.10	w199421
w199422	5.9	1.8L	.8L	.17	92	3.2	.98	2.1	.4	.070	w199422
w199425	15	2.9L	1.3L	.36	100	6.5	1.8	.26L	1.6	.090	w199425
w195104	8.3	2.0L	.9L	.28	80	2.5	1.4	.27	.7	.36	w195104
w195105	19	2.0L	.9L	.34	27	2.7	1.4	.18L	.5	.24	w195105
w195106	11	1.8L	.8L	.29	26	2.4	1.1	.16L	.6	.24	w195106
w195107	8.8	1.4L	.6L	.20	52	1.7	.88	.13L	.5	.37	w195107
w195108	19	2.2L	1.0L	.34	220	3.2	1.8	.20L	.7	.74	w195108
w195109	20	1.1	.6	.17	180	.8	1.2	.07	.2	.68	w195109
w195110	15	2.7L	1.2L	.26	92	3.4	.85L	.24L	.5	.48	w195110
w195131	27	2.4L	1.1L	.53	100	2.4	1.3	.22L	.9	.20	w195131
w195132	18	1.9L	.9L	.56	120	1.5	1.2	.18L	.5	.12	w195132
w201530	25	6.8L	3.1L	.83	100	23	4.7L	2.2	2.6	.080	w201530
w201531	29	4.0L	1.8L	.52	65	10	2.7L	.55	.9	.12	w201531
w201532	25	5.7L	2.6L	.79	85	16	3.9L	.52	1.8	.12	w201532
w201533	8.8	2.1L	.9L	.35	27	5.1	2.1	.47	.5	.12	w201533
w201534	15	2.5	1.5	.54	25	5.8	1.9	2.4	.2	.23	w201534
w194951	5.9	1.7	.8L	.23	51	2.5	1.4	2.3	.4	.55	w194951
w194952	30	3.4L	1.6L	.58	120	8.0	2.0	.47	.9	.52	w194952
w194953	26	6.2L	2.8L	.70	160	16	2.8	1.4	2.5	.39	w194953
w194954	16	3.1L	1.4L	.33	83	5.8	1.8	.28	.8	.72	w194954
w194955	17	2.8L	1.3L	.52	59	6.2	2.2	1.4	1.2	.68	w194955
w194956	20	3.1L	1.4L	.42	120	7.2	1.6	.28L	1.5	.57	w194956
w194957	20	4.0L	1.8L	.46	120	8.5	2.2	.36L	1.7	.12	w194957
w194958	4.1	1.5L	.7L	.12	55	2.2	1.3	1.2	.4	.19	w194958
w194959	4.5	1.8L	.8L	.17	19	2.9	1.5	.42	.4	.21	w194959
w194960	7.1	1.9L	.9L	.18	59	2.6	1.5	2.1	.4	.30	w194960
w194961	7.7	2.1L	1.0L	.17	120	3.6	.96	.58	.7	.58	w194961
w194962	5.6	1.5L	.7L	.14	160	2.4	.88	2.8	.4	.26	w194962
w194963	6.2	2.2L	1.0L	.15	51	2.4	2.1	1.6	.4	.74	w194963
w194964	6.7	2.2L	1.0L	.17	87	2.7	1.4	3.1	.5	.42	w194964
w194965	4.5	1.7L	.8L	.12	55	2.5	1.2	1.2	.4	.20	w194965
w194966	7.6	2.8L	1.3L	.13	120	2.8	1.7	3.8	.4	.27	w194966
w194967	7.5	3.1L	1.4L	.28	220	4.3	1.7	1.1	.8	.24	w194967
w194968	4.7	1.4L	.7L	.17	35	3.2	.98	.72	.6	.19	w194968
w194969	6.6	1.9L	.9L	.17	34	2.3	1.1	.17	.5	.22	w194969
w194970	5.0	1.7L	.8L	.22	59	2.9	1.1	4.4	.4	.21	w194970
w194971	11	3.2L	1.5L	.28	250	3.4	1.9	.29	.7	.060	w194971
w194972	5.4	1.4L	.7L	.12	83	1.5	.91	.20	.4	.050	w194972
w194973	5.6	1.4L	.6L	.10	130	2.5	.88	3.0	.4	.15	w194973

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Ho-S (ppm)	In-S (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Sample number
w199421	0.48L	0.48L	5	10	0.1	26	2.0	1.0	4.8	4.7	w199421
w199422	.57L	.57L	5	9.0	.1	19	.57	.82	3.8L	3.8	w199422
w199425	.92L	.92L	17	16	.2	7.8	1.2	4.5	12	15	w199425
w195104	.64L	.64L	9	11	.1	12	.64	2.0	8.7	12	w195104
w195105	.62L	.62L	10	11	.1	14	1.6	1.2	11	8.7	w195105
w195106	.57L	.57L	10	12	.1	11	.74	2.5	8.2	12	w195106
w195107	.44L	.44L	7	11	.1	8.2	.88	2.1	6.9	6.9	w195107
w195108	.70L	.70L	12	21	.1	12	4.1	2.6	12	15	w195108
w195109	.32	.25L	5	6.0	.1	17	1.9	1.2	6.0	4.9	w195109
w195110	.85L	.85L	9	7.9	.1	20	3.3	1.7	11	11	w195110
w195131	.78L	.78L	19	20	.2	10	.78	1.0	10	6.1	w195131
w195132	.62L	.62L	21	14	.2	9.7	1.4	.44	11	6.7	w195132
w201530	2.2L	2.2L	21	110	.4	12	.62L	6.5	16	40	w201530
w201531	1.3L	1.3L	14	53	.2	6.2	1.6	2.0	11	24	w201531
w201532	1.8L	1.8L	26	34	.3	13	1.6	4.2	26	20	w201532
w201533	.66L	.66L	8	5.9	.1	54	2.6	1.4	7.6	15	w201533
w201534	.34L	.34L	6	5.3	.4	3.2	6.2	.58	7.7	58	w201534
w194951	.53L	.53L	5	9.0	.1	21	8.3	.68	5.9	20	w194951
w194952	1.1L	1.1L	15	31	.2	20	2.7	.78	7.6	17	w194952
w194953	2.0L	2.0L	22	110	.3	26	2.0	4.5	18	24	w194953
w194954	.99L	.99L	10	18	.1	28	1.4	1.3	6.5L	7.1	w194954
w194955	.90L	.90L	12	30	.2	6.1	2.3	1.9	9.4	27	w194955
w194956	.99L	.99L	16	14	.2	18	.85	4.4	12	12	w194956
w194957	1.3L	1.3L	18	62	.2	12	.54	6.5	16	12	w194957
w194958	.48L	.48L	4	6.7	.1	12	1.1	1.9	5.5	6.2	w194958
w194959	.59L	.59L	4	4.2	.1	20	1.6	1.0	4.8	6.0	w194959
w194960	.60L	.60L	5	11	.1	28	1.1	.77	4.9	3.7	w194960
w194961	.67L	.67L	6	15	.1	25	1.2	1.2	6.5	5.1	w194961
w194962	.48L	.48L	5	8.2	.1	12	1.5	1.1	5.9	5.6	w194962
w194963	.71L	.71L	5	11	.1	37	1.2	1.0	4.6L	4.8	w194963
w194964	.69L	.69L	5	11	.1	25	2.5	2.3	7.0	7.7	w194964
w194965	.54L	.54L	5	7.2	.1	16	1.0	.62	5.0	4.0	w194965
w194966	.89L	.89L	4	4.1	.1	290	2.4	1.0	5.8L	4.2	w194966
w194967	.99L	.99L	10	18	.1	31	.43	.99	9.2	6.5	w194967
w194968	.46L	.46L	5	6.5	.1	11	.98	1.3	4.7	4.4	w194968
w194969	.60L	.60L	5	9.5	.1	22	.26	1.1	4.0L	3.6	w194969
w194970	.53L	.53L	6	9.0	.1	11	1.4	.68	5.1	5.8	w194970
w194971	1.0L	1.0L	9	9.2	.1	80	2.5	1.0	8.9	8.8	w194971
w194972	.46L	.46L	4	9.1	.1	9.1	.65	.78	3.0L	3.1	w194972
w194973	.44L	.44L	4	6.9	.1L	5.0	1.4	1.4	4.8	5.0	w194973

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Virginia reported on whole-coal basis--continued

Sample number	P (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Re-S (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sample number
w199421	27	1.4	4.7L	28L	0.69L	0.50	1.8	1.4	0.90	0.14L	w199421
w199422	14	2.2	5.6L	45L	.82L	2.0L	2.0	1.6	.90	.16L	w199422
w199425	35	10	9.0L	43L	1.3L	1.8	4.8	7.2	2.0	1.5	w199425
w195104	32	3.0	6.2L	4L	.91L	.20	2.1	1.8L	1.5	.36	w195104
w195105	54	12	6.1L	6L	.89L	.30	2.9	2.2L	2.0	.18L	w195105
w195106	22	3.9	5.6L	6L	.82L	.10	2.1	1.1	1.6	.41	w195106
w195107	44	3.2	4.3L	5L	.63L	.20	1.6	1.1	.80	.44	w195107
w195108	9	6.1	6.8L	6	1.0L	1.2	2.7	2.1	1.9	.30	w195108
w195109	B	12	3.1	6L	.35L	.50	.80	1.9	.80	.07L	w195109
w195110	140	2.4	8.3L	7L	1.2L	1.0	2.6	1.8	1.4	.24L	w195110
w195131	49	8.0	7.5L	28L	1.1L	1.2	4.3	2.4	3.0	.44	w195131
w195132	46	5.9	6.0L	26L	.88L	.20	3.1	1.7	3.1	.44	w195132
w201530	30	24	21L	41	3.1L	1.2	12	12	4.2	2.8	w201530
w201531	12	12	12L	20	1.8L	.50	7.3	11	2.8	.36	w201531
w201532	15	8.6	18L	71	2.6L	.80	9.2	8.6	3.8	.78	w201532
w201533	5	2.9	6.4L	30L	.94L	.90	3.2	3.1	1.7	.19L	w201533
w201534	1	3.6	3.3L	30L	.48L	.80	2.8	9.1	2.2	N	w201534
w194951	52	8.3	5.1L	51L	.75L	1.5	1.8	1.3	1.0	.15L	w194951
w194952	180	13	11L	74L	1.6L	.50	5.6	5.7	2.7	.31L	w194952
w194953	37	18	19L	81L	2.8L	.60	8.9	5.8	3.3	1.1	w194953
w194954	68	7.1	9.7L	58L	1.4L	.60	3.7	4.8	1.5	.28L	w194954
w194955	140	10	8.8L	58L	1.3L	.40	5.5	5.4	2.3	.26L	w194955
w194956	6	17	9.7L	56L	1.4L	.30	5.9	9.9	2.2	1.1	w194956
w194957	63	16	12L	61L	1.8L	.40	6.6	6.7	2.4	1.1	w194957
w194958	140	3.9	4.7L	57L	.69L	.30	1.8	1.1	.70	.14L	w194958
w194959	40	3.0	5.7L	49L	.84L	.40	2.2	6.1L	.70	.17L	w194959
w194960	120	3.7	5.8L	47L	.85L	.30	2.0	1.4	.80	.17L	w194960
w194961	380	5.1	6.5L	41L	.96L	.30	2.6	3.3	1.0	.19L	w194961
w194962	360	3.9	4.6L	31L	.68L	.40	2.0	1.4	.80	.14L	w194962
w194963	84	3.6	6.9L	52L	1.0L	.30	1.7	1.2	.80	.20L	w194963
w194964	240	4.9	6.7L	40L	.98L	.30	2.5	1.3	.90	.20L	w194964
w194965	30	2.8	12L	47L	.77L	.20	1.7	.6	.70	.31	w194965
w194966	260	8.5	8.6L	35L	1.3L	.30	2.0	4.7L	.80	.25L	w194966
w194967	1,200	5.1	9.7L	43L	1.4L	.20	4.2	2.5	1.5	.28L	w194967
w194968	28	3.3	4.4L	33L	.65L	.20	2.3	1.3	.90	.20	w194968
w194969	38	4.0	5.8L	44L	.86L	.20	2.0	1.3	.80	.17L	w194969
w194970	95	3.4	5.1	36L	.75L	.60	2.8	1.9	1.1	.15L	w194970
w194971	500	5.8	9.9L	42L	1.5L	.50	3.4	.9	1.5	.29L	w194971
w194972	150	3.0	4.4L	29L	.65L	.20	1.6	1.4	.70	.13L	w194972
w194973	360	4.2	4.3L	33L	.63L	.60	2.1	2.0	.70	.13	w194973

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	Tm-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Sample number
w199421	48	0.1	3.0L	2.0	0.35L	0.20	10	3.1	0.4	4.6	w199421
w199422	110	.5L	3.0L	.25L	.41L	.20L	6.4	2.5	.4	6.7	w199422
w199425	51	.3	7.0	.40L	.66L	.90	26	7.8	.9	7.3	w199425
w195104	130	.3	3.0L	.27L	.46L	1.1	14	6.6	.7	12	w195104
w195105	140	.3	3.0L	.36	.45L	2.4	13	6.3	.7	4.9	w195105
w195106	110	.3	3.0L	.25L	.41L	1.2	13	5.2	.6	4.2	w195106
w195107	230	.4L	3.0L	.19L	.32L	1.3	8.8	4.8	.5	4.5	w195107
w195108	120	.2	3.0L	1.7	.50L	3.8	16	8.1	.6	15	w195108
w195109	280	.4L	3.0L	.11L	.18L	1.0	4.6	6.0	.4	4.6	w195109
w195110	300	.2	3.0L	.37L	.61L	2.1	18	6.0	.6	15	w195110
w195131	130	.4	3.0L	.33L	.56L	2.7	16	6.4	1.1	7.5	w195131
w195132	75	.4	3.0L	.26L	.44L	1.3	14	7.7	.9	7.1	w195132
w201530	68	.6	13	.93L	1.6L	2.8	71	12	2.2	16	w201530
w201531	49	.4	7.0	.55L	.91L	2.1	40	7.5	1.0	15	w201531
w201532	68	.6	7.0	.78L	1.3L	2.0	65	15	1.9	31	w201532
w201533	140	.3	3.0L	.28L	.47L	.70	19	9.4	.8	27	w201533
w201534	20	.6	3.0L	3.8	.24L	.40	9.6	13	2.1	30	w201534
w194951	46	.2	3.0L	2.7	.38L	.90	8.3	5.9	.6	59	w194951
w194952	110	.4	5.0	.47L	.78L	1.7	34	8.4	1.1	14	w194952
w194953	71	.5	13	.85L	1.4L	2.3	51	12	1.8	37	w194953
w194954	51	.2	5.0	.43L	.71L	1.9	16	3.4	.7	20	w194954
w194955	100	.4	6.0	.39L	.65L	1.4	25	8.5	1.2	17	w194955
w194956	45	.3	7.0	.43L	.71L	1.9	28	8.1	.9	6.7	w194956
w194957	51	.4	6.0	.54L	.91L	2.0	42	12	1.2	10	w194957
w194958	140	.1	5.0	.21L	.35L	.70	10	5.0	.5	4.9	w194958
w194959	48	.2	3.0L	.25L	.42L	.90	11	4.5	.5	8.4	w194959
w194960	120	.1	3.0L	.26L	.43L	1.2	7.8	3.0	.3	5.4	w194960
w194961	140	.2	3.0L	.29L	.48L	.90	12	3.1	.6	12	w194961
w194962	140	.1	3.0L	.20L	.34L	.90	12	3.4	.4	16	w194962
w194963	130	.5L	3.0L	.30L	.51L	5.1	6.2	2.4	.3	15	w194963
w194964	140	.2	3.0L	.29L	.49L	.90	11	5.6	.5	15	w194964
w194965	61	.5L	3.0L	.23L	.39L	1.1	7.5	2.5	.4	6.7	w194965
w194966	62	.2	3.0L	.38L	.64L	.90	6.9	4.6	.5	17	w194966
w194967	450L	.2	3.0L	.43L	.71L	1.2	14	4.5	.7	11	w194967
w194968	91	.1	3.0L	.20L	.33L	1.0	14	4.0	.4	6.2	w194968
w194969	100	.1	3.0L	.26L	.43L	.90	7.5	2.7	.4	6.8	w194969
w194970	49	.2	3.0L	.23L	.38L	1.1	9.8	4.6	.6	9.8	w194970
w194971	44	.2	3.0L	.44L	.73L	1.7	13	5.4	.6	32	w194971
w194972	65	.4L	3.0L	.20L	.33L	.80	7.2	2.4	.3	8.5	w194972
w194973	200	.1	3.0L	.19L	.32L	.90	14	2.8	.3	8.2	w194973

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Zr-S (ppm)
w199421	9.7
w199422	9.8
w199425	26
w195104	19
w195105	15
w195106	23
w195107	21
w195108	32
w195109	16
w195110	15
w195131	11
w195132	9.7
w201530	31
w201531	13
w201532	37
w201533	19
w201534	4.8
w194951	6.8
w194952	12
w194953	31
w194954	8.4
w194955	15
w194956	31
w194957	43
w194958	23
w194959	11
w194960	10
w194961	7.9
w194962	16
w194963	8.7
w194964	28
w194965	6.2
w194966	12
w194967	13
w194968	14
w194969	8.2
w194970	7.5
w194971	14
w194972	9.1
w194973	12

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w194974	1.1	0.67	0.25	0.032	0.020	0.094	1.4	0.049	0.01L	10	w194974
w194975	1.4	.86	.29	.036	.020	.11	.83	.049	.01L	10	w194975
w194976	1.5	1.0	.28	.036	.030	.093	1.1	.052	.01L	11	w194976
w194977	.86	.66	.38	.032	.040	.077	.97	.037	.01L	9.0	w194977
w194978	3.4	1.7	.093	.052	.030	.31	2.5	.11	.02L	15	w194978
w194979	2.8	1.2	.16	.060	.040	.25	1.3	.087	.01	9.0	w194979
w194980	.97	.70	.18	.038	.020	.11	.97	.037	.01L	14	w194980
w194981	1.0	.67	.20	.034	.030	.086	1.5	.039	.01L	13	w194981
w194982	.71	.50	.34	.029	.010	.068	1.4	.028	.01L	12	w194982
w194983	1.1	.63	.25	.038	.010	.10	1.7	.041	.01L	26	w194983
w194984	2.6	1.0	.056	.050	.020	.19	.43	.068	.01	9.0	w194984
w194985	1.9	.91	.064	.043	.030	.17	.26	.072	.02	4.0	w194985
w194986	1.9	1.2	.043	.048	.030	.22	.39	.058	.02	10	w194986
w194987	.59	.43	.035	.022	.020	.085	.33	.020	.02	16	w194987
w194988	.66	.47	.064	.020	.050	.021	.17	.031	.01	5.0	w194988
w194989	1.1	.71	.041	.010	.020	.029	.30	.040	.10	12	w194989
w194990	.84	.50	.031	.021	.030	.10	.51	.028	.02	87	w194990
w194991	1.9	1.1	.044	.017	.030	.047	.96	.082	.04	47	w194991
w194992	3.9	2.3	.16	.063	.050	.32	1.1	.18	.10	73	w194992
w194993	2.9	1.6	.050	.023	.060	.097	.12	.23	.03	2.0	w194993
w194994	4.8	2.9	.064	.088	.050	.52	.24	.19	.02L	2.0	w194994
w194995	7.5	4.6	.071	.13	.050	.80	.42	.29	.03L	2.0	w194995
w194996	2.5	1.6	.042	.033	.040	.15	.15	.11	.02	2.0	w194996
w194997	13	6.0	.090	.17	.16	1.2	.75	.38	.05L	2.0	w194997
w194998	1.5	.77	.037	.011	.040	.048	.069	.053	.01	1.0L	w194998
w194999	2.4	1.3	.042	.021	.040	.11	.16	.094	.01L	2.0	w194999
w195000	1.5	1.1	.070	.025	.020	.12	.12	.043	.01	1.0	w195000
w195001	2.8	1.4	.067	.041	.040	.19	.27	.12	.02	5.0	w195001
w195002	.89	.68	.075	.016	.020	.045	.12	.022	.02	1.0L	w195002
w195003	6.0	3.4	.076	.14	.089	.79	.73	.15	.05	11	w195003
w195004	2.3	.91	.057	.016	.030	.078	.096	.073	.02	1.0	w195004
w195009	1.4	.50	.093	.031	.030	.12	1.3	.022	.01	28	w195009
w195010	1.4	1.2	.075	.028	.030	.10	.15	.11	.08	1.0	w195010
w195011	2.5	1.4	.079	.028	.030	.10	.62	.13	.06	10	w195011
w195012	.47	.31	.087	.008	.020	.041	.47	.011	.05	8.0	w195012
w195013	.80	.38	.13	.035	.040	.10	.72	.018	.01	11	w195013
w195014	1.9	.67	.091	.025	.040	.089	.33	.072	.03	4.0	w195014
w195015	.73	.52	.17	.030	.030	.063	1.3	.027	.03	32	w195015
w195016	5.7	2.9	.14	.11	.13	.43	.59	.19	.16	5.0	w195016
w195017	2.3	1.2	.11	.033	.040	.15	1.3	.11	.06	13	w195017

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Virginia reported on whole-coal basis--continued

Sample number	Au-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Bi-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w194974	0.8L	24	71	0.7	1.1L	0.05	9.0	1.3	7.2	0.3	w194974
w194975	.7L	13	55	.6	1.1L	.05	9.0	2.2	11	.7	w194975
w194976	.9L	25	55	.5	1.3L	.06	9.0	2.3	12	.5	w194976
w194977	.7L	24	86	.3	1.0L	.04	8.0	2.0	9.7	.4	w194977
w194978	1.6L	19	55	.8	2.4L	.28	18	10	22	1.4	w194978
w194979	1.2L	23	94	.5	1.8L	.06	13	3.3	14	.8	w194979
w194980	.6L	23	76	.3	.9L	.04	7.0	2.0	7.0	.4	w194980
w194981	.7L	26	74	.4	1.1L	.04	8.0	3.0	8.7	.4	w194981
w194982	.6L	18	69	.7	.9L	.04	6.0	1.8	5.8	.3	w194982
w194983	.8L	18	54	.7	1.2L	.04	7.0	1.3	8.0	.5	w194983
w194984	.9L	7.0	41	3.7	1.4L	.03	14	7.2	12	1.1	w194984
w194985	.8L	8.3	50	1.8	1.1L	.04	14	5.4	9.7	1.0	w194985
w194986	.8L	4.3	55	1.4	1.2L	.04	17	8.0	13	1.3	w194986
w194987	.3L	1.6	16	1.2	.5L	.06	6.0	3.1	4.5	.8	w194987
w194988	.3L	3.8	29	1.9	.5L	.04	7.0	6.2	5.8	.2	w194988
w194989	.5L	1.8	28	2.1	.7L	.06	17	11	8.2	.2	w194989
w194990	.4L	1.9	30	1.7	.6L	.09	8.0	3.9	6.0	.6	w194990
w194991	.9L	3.3	21	1.5	1.3L	.11	25	6.8	12	.4	w194991
w194992	1.7L	8.6	130	2.0	2.5L	.14	43	12	29	1.5	w194992
w194993	1.1L	15	66	1.0	1.6L	.04	22	5.4	26	2.2	w194993
w194994	1.8L	24	100	1.6	2.7L	.07	34	2.7	32	.6	w194994
w194995	2.8L	24	130	3.1	4.2L	.05	44	15	47	2.9	w194995
w194996	1.0L	17	48	1.0	1.4L	.05	23	7.1	19	1.0	w194996
w194997	4.5L	34	150	1.8	6.8L	.05	56	5.0	56	5.1	w194997
w194998	.5L	11	22	.7	.8L	.03	11	4.8	8.2	.2	w194998
w194999	.9L	4.6	34	1.3	1.3L	.05	41	3.6	13	.4	w194999
w195000	.7L	9.1	39	14	1.0L	.01	16	13	12	.6	w195000
w195001	1.1L	10	50	3.3	1.6L	.07	21	9.1	18	1.0	w195001
w195002	.4L	6.6	26	.7	.6L	.04	12	8.2	5.0	.2	w195002
w195003	2.3L	19	110	4.2	3.5L	.17	31	13	33	3.9	w195003
w195004	.7L	6.3	34	3.1	1.1L	.03	10	5.2	9.7	.3	w195004
w195009	.7L	30	17	2.5	1.1L	.11	7.0	8.2	7.9	.5	w195009
w195010	.6L	24	32	4.7	.9L	.06	11	13	14	.2	w195010
w195011	1.0L	33	42	1.4	1.5L	.08	20	4.7	17	.4	w195011
w195012	.3L	38	44	4.1	.4L	.07	5.0	8.6	3.6	.2	w195012
w195013	.5L	41	31	2.0	.7L	.04	5.0	6.8	4.2	.4	w195013
w195014	.7L	47	46	2.5	1.0L	.03	14	3.9	9.4	.3	w195014
w195015	.6L	58	39	2.2	.9L	.02	8.0	1.9	5.2	.2	w195015
w195016	2.1L	27	120	9.9	3.1L	.27	47	8.3	24	1.4	w195016
w195017	1.1L	25	140	4.3	1.6L	.04	18	4.0	16	.4	w195017

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	Sample number
w194974	5.5	1.7L	0.8L	0.15	75	1.8	0.98	1.4	0.4	0.37	w194974
w194975	6.1	1.6L	.7L	.17	120	1.9	1.0	1.4	.4	.26	w194975
w194976	5.9	1.9L	.9L	.17	83	1.9	1.2	.17	.5	.22	w194976
w194977	5.3	1.5L	.7L	.18	120	2.2	.99	.33	.4	.30	w194977
w194978	10	3.6L	1.6L	.34	87	3.9	2.3	2.1	.9	.25	w194978
w194979	8.7	2.7L	1.2L	.26	99	2.5	1.7	.73	.9	.31	w194979
w194980	4.7	1.4L	.6L	.14	63	1.7	.44L	.25	.3	.48	w194980
w194981	6.2	1.6L	.7L	.19	37	1.8	.52L	.59	.3	.25	w194981
w194982	3.8	1.4L	.6L	.11	150	2.2	.88	4.9	.2	.18	w194982
w194983	4.3	1.8L	.8L	.10	63	1.8	1.1	2.4	.4	.22	w194983
w194984	18	2.1L	.9L	.26	43	3.1	1.0	1.3	.7	.050	w194984
w194985	17	1.7L	.8L	.24	58	2.4	.75	.30	.6	.040	w194985
w194986	17	1.8L	.8L	.39	43	3.0	1.4	.16	.4	.030	w194986
w194987	10	.7L	.3L	.13	29	1.0	.37	.28	.2	.090	w194987
w194988	9.9	.7L	.3L	.15	37	1.7	.67	2.7	.3	.070	w194988
w194989	44	1.1L	.5	.37	32	1.5	.91	1.1	.4	.080	w194989
w194990	13	.9L	.4L	.19	31	1.6	.65	1.5	.3	.070	w194990
w194991	27	1.9L	1.1	.49	27	2.2	2.1	.17L	.8	.66	w194991
w194992	38	3.6L	1.8	.85	290	5.9	2.5	.33	1.5	.47	w194992
w194993	18	2.3L	1.1L	.40	43	3.4	1.1	.21L	1.1	.12	w194993
w194994	12	4.0L	1.8L	.49	120	5.8	1.5	.36L	2.2	.12	w194994
w194995	18	6.2L	2.8L	.66	140	9.1	2.3	.57L	2.1	.080	w194995
w194996	11	2.1L	1.0L	.37	51	3.5	.76	.19L	.9	.050	w194996
w194997	18	9.9L	4.5L	.78	230	9.9	3.2	.90L	2.9	.050	w194997
w194998	7.8	1.1L	.5L	.22	21	1.4	.62	.10L	.5	.010	w194998
w194999	17	1.9L	.9L	.35	37	1.5	1.0	.17L	1.3	.030	w194999
w195000	14	1.6	1.1	.51	39	11	1.2	5.3	.4	.010	w195000
w195001	18	2.3L	1.1L	.34	94	3.2	.95	.74	.9	.12	w195001
w195002	6.6	.9L	.4L	.30	34	1.2	.51	.12	.2	.020	w195002
w195003	32	5.1L	2.3L	.49	270	11	2.1	1.9	1.2	.16	w195003
w195004	12	1.6L	.7	.25	38	2.3	.79	.14	.6	.020	w195004
w195009	12	1.6	.7L	.27	51	4.8	1.3	2.4	.2	.67	w195009
w195010	17	1.4L	1.1	.31	48	4.3	.99	3.3	.8	.21	w195010
w195011	37	2.2L	1.0L	.38	42	3.9	1.8	.20	1.0	.52	w195011
w195012	7.0	1.9	1.2	.29	30	7.5	1.3	4.4	.1	.17	w195012
w195013	11	1.0	.5L	.13	90	5.0	.90	1.9	.2	.23	w195013
w195014	20	1.5L	.9	.28	74	3.6	1.6	2.9	1.0	.32	w195014
w195015	5.8	1.3L	.6L	.21	45	4.9	1.2	2.6	.3	.72	w195015
w195016	41	6.2	2.7	1.0	110	8.2	4.7	.41L	1.4	.21	w195016
w195017	25	2.3L	1.3	.33	110	7.5	1.8	2.5	.9	.41	w195017

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Ho-S (ppm)	In-S (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Sample number
w194974	0.53L	0.53L	5	5.0	0.1L	22	0.60	0.68	3.5L	2.6	w194974
w194975	.52L	.52L	5	8.1	.1	22	.59	.37	3.4L	3.6	w194975
w194976	.60L	.60L	6	11	.1	35	.34	.69	4.8	3.6	w194976
w194977	.46L	.46L	5	3.0	.1	17	.40	.20	3.0L	2.7	w194977
w194978	1.1L	1.1L	9	16	.1	31	.49	.97	7.5L	9.1	w194978
w194979	.85L	.85L	7	9.4	.1	24	.85	1.1	9.0	6.1	w194979
w194980	.44L	.44L	4	4.2	.1	13	.44	.13L	2.9L	2.8	w194980
w194981	.52L	.52L	5	5.8	.1	19	1.0	.30	4.5	4.2	w194981
w194982	.44L	.44L	3	2.9	.1	37	.76	.25	2.9L	2.7	w194982
w194983	.56L	.56L	4	5.2	.1	30	2.6	.32	3.9	2.7	w194983
w194984	.66L	.66L	9	13	.1	8.7	.38	.94	6.6	8.6	w194984
w194985	.53L	.53L	8	9.8	.1	9.8	.30	.90	5.2	6.7	w194985
w194986	.57L	.57L	9	15	.2	7.5	1.3	1.1	8.9	11	w194986
w194987	.22L	.22L	3	5.9	.1	3.4	.81	.09	1.6	2.8	w194987
w194988	.22L	.22L	4	5.4	.1	18	.35	.83	4.2	11	w194988
w194989	.34L	.34L	10	12	.1	2.7	2.6	.53	5.3	18	w194989
w194990	.30L	.30L	4	7.3	.1	4.3	1.8	.30	3.8	6.0	w194990
w194991	.60L	.60L	13	18	.2	16	3.3	2.4	9.5	12	w194991
w194992	1.2L	1.2L	26	40	.3	11	2.6	4.1	16	18	w194992
w194993	.74L	.74L	12	24	.2	2.0	.64	3.2	8.4	6.6	w194993
w194994	1.3L	1.3L	20	22	.2	6.9	.73	3.3	8.6	9.3	w194994
w194995	2.0L	2.0L	26	51	.3	24	.57L	5.1	15	14	w194995
w194996	.67L	.67L	15	14	.1	2.8	.57	1.7	6.0	10	w194996
w194997	3.2L	3.2L	38	76	.3	54	.90L	3.6	21L	13	w194997
w194998	.36L	.36L	8	7.8	.1	1.5	.47	1.0	3.8	8.3	w194998
w194999	.61L	.61L	26	12	.3	2.6	.35	1.0	4.9	3.7	w194999
w195000	.46L	.46L	11	13	.3	4.4	1.2	.65	7.8	7.8	w195000
w195001	.74L	.74L	15	12	.1	3.9	.63	1.7	7.8	13	w195001
w195002	.27L	.39	7	5.5	.1	2.1	1.0	.16	4.7	12	w195002
w195003	1.6L	1.6L	21	32	.4	22	1.9	1.4	13	26	w195003
w195004	.50L	.50L	7	9.4	.1	2.6	.65	1.2	6.1	7.9	w195004
w195009	.50L	.50L	4	4.8	.3	140	5.2	.58	3.3L	18	w195009
w195010	.43L	.43L	7	4.2	.2	120	.62	3.2	7.4	19	w195010
w195011	.71L	.71L	13	27	.2	3.8	1.9	2.5	9.8	15	w195011
w195012	.55	.20L	2	5.2	.3	1.6	4.9	.41	2.7	20	w195012
w195013	.32L	.32L	3	4.0	.1	63	1.8	.63	2.1	6.3	w195013
w195014	.47L	.47L	9	10	.2	4.8	.47	2.7	10	11	w195014
w195015	.41L	.41L	5	7.5	.1	14	1.2	1.2	3.2	3.9	w195015
w195016	1.4L	1.4L	33	27	.3	49	.62	6.8	33	25	w195016
w195017	.74L	.74L	13	20	.2	8.3	2.3	1.8	9.4	13	w195017

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	P (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Re-S (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sample number
w194974	130	2.7	11L	69L	0.75L	0.40	1.7	1.5	0.70	0.15L	w194974
w194975	240	3.9	5.0L	66L	.74L	.50	2.2	1.3	.90	.15L	w194975
w194976	15	3.7	5.8L	74L	.86L	.30	2.1	1.2	.90	.17L	w194976
w194977	370	3.0	4.5L	83L	.66L	.40	1.9	1.8	.80	.13L	w194977
w194978	35	7.5	11L	83L	1.6L	.40	3.5	1.7	1.6	.32L	w194978
w194979	190	3.9	8.2L	81L	1.2L	.30	2.8	2.0	1.2	.24L	w194979
w194980	150	2.7	4.3L	45L	.63L	.30	1.4	1.6	.60	.13L	w194980
w194981	290	2.7	5.0L	50L	.74L	.30	1.6	1.8	.90	.15L	w194981
w194982	69	1.6	4.3L	42L	.63L	.30	1.6	1.1	.50	.13L	w194982
w194983	210	2.6	5.4L	45L	.80L	.60	1.5	.8	.60	.56L	w194983
w194984	B	7.3	6.4L	58L	.94L	1.3	2.5	3.8	1.5	.19L	w194984
w194985	3	6.0	5.1L	55L	.75L	.70	2.4	3.6	1.2	.45	w194985
w194986	7	5.3	5.5L	54L	.81L	.90	3.1	1.5	2.0	.16L	w194986
w194987	5	2.6	2.1L	47L	.31L	1.2	1.0	1.7	.70	.06L	w194987
w194988	14	3.0	2.2L	48L	.32L	1.1	1.3	4.7	.70	.13	w194988
w194989	10	8.2	3.3L	44L	.48L	5.1	2.5	3.2	1.9	.10L	w194989
w194990	36	3.4	2.9L	47L	.43L	2.1	1.5	2.1	1.0	.22	w194990
w194991	26	5.5	5.8L	47L	.86L	1.1	2.7	6.0	2.7	.17L	w194991
w194992	790	18	11L	59L	1.7L	3.6	6.0	7.4	4.4	.33L	w194992
w194993	130	12	7.2L	54L	1.1L	.40	4.4	6.7	2.1	.85	w194993
w194994	48	10	12L	51L	1.8L	.60	5.4	8.9	2.6	.73	w194994
w194995	12	15	19L	54	2.8L	.70	8.3	3.9	3.6	1.1	w194995
w194996	100	7.0	6.5L	44L	.95L	.40	3.7	5.1	2.0	.48	w194996
w194997	39	19	31L	83	4.5L	.40	10	11	4.7	1.4	w194997
w194998	14	3.8	3.5L	30L	.52L	.10	1.6	3.4	1.3	.21	w194998
w194999	23	8.5	5.9L	38L	.87L	.60	3.3	2.2	4.0	.26	w194999
w195000	3	6.1	4.4L	31L	.65L	1.3	3.8	1.3	2.6	.26	w195000
w195001	14	9.2	7.1L	35L	1.1L	.60	3.6	5.8	2.0	.53	w195001
w195002	10	2.7	2.7L	25L	.39L	.20	1.1	3.3	1.6	.16	w195002
w195003	61	20	16L	52	2.3L	1.8	8.6	1.4	3.2	1.2	w195003
w195004	13	5.3	4.9L	26L	.72L	.40	2.2	3.3	1.3	.29	w195004
w195009	53	16	4.9L	32L	.72L	2.8	6.1	3.2	1.3	.14L	w195009
w195010	16	14	4.2L	24L	.62L	1.1	3.9	6.3	1.7	.50	w195010
w195011	18	22	6.9L	29L	1.0L	.60	3.9	5.4	2.1	.61	w195011
w195012	14	3.2	4.4L	24L	.29L	3.1	3.9	1.4	1.3	.06	w195012
w195013	220	3.8	5.0	26L	.45L	.90	2.0	1.7	.70	.09L	w195013
w195014	15	6.3	4.6L	26L	.67L	.60	2.4	4.1	1.6	.20	w195014
w195015	35	4.9	7.5	26L	.58L	.50	2.4	8.8	1.1	.12L	w195015
w195016	200	18	14L	27	2.1L	.20	6.2	16	5.7	1.4	w195016
w195017	79	12	7.2L	30L	1.1L	1.0	3.6	2.9	2.0	.53	w195017

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	Tm-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Sample number
w194974	110	0.3L	3.0L	0.23L	0.38L	0.90	6.5	2.9	0.3	12	w194974
w194975	96	.2	3.0L	.22L	.37L	.90	7.0	2.1	.4	8.9	w194975
w194976	52	.2	3.0L	.26L	.43L	1.1	7.1	2.7	.4	13	w194976
w194977	150	.3L	3.0L	.20L	.33L	.80	5.3	2.2	.3	11	w194977
w194978	44	.2	3.0L	.49L	.81L	2.5	12	4.1	.6	45	w194978
w194979	93	.2	3.0L	.36L	.61L	1.9	13	5.8	.5	17	w194979
w194980	88	.1	3.0L	.19L	.32L	.90	4.0	1.9	.2	14	w194980
w194981	89	.2	3.0L	.22L	.37L	1.2	6.4	2.6	.3	12	w194981
w194982	60	.3L	3.0L	.19L	.32L	.50	3.3	2.3	.3	8.2	w194982
w194983	52	.3L	3.0L	.24L	.40L	.90	4.0	1.9	.3	12	w194983
w194984	89	.3	3.0L	.28L	.47L	1.3	14	6.2	.6	8.1	w194984
w194985	71	.3	3.0L	.23L	.38L	1.2	11	4.7	.6	5.1	w194985
w194986	76	.3	3.0L	.24L	.41L	2.3	15	7.5	.7	6.0	w194986
w194987	31	.2	30	.74	.16L	1.2	4.0	2.0	.4	2.9	w194987
w194988	51	.1	3.0L	.10L	.16L	1.3	7.7	4.8	.3	4.2	w194988
w194989	33	.3	3.0L	.48L	.24L	3.4	16	5.3	.7	3.3	w194989
w194990	16	.3L	3.0L	1.0	.22L	2.5	7.3	3.5	.4	12	w194990
w194991	45	.4	3.0L	.26L	.43L	1.6	12	11	1.1	9.5	w194991
w194992	230	.6	5.0L	.50L	.83L	4.0	30	14	1.7	18	w194992
w194993	110	.3	3.0L	.32L	.53L	1.3	16	6.4	.6	2.3	w194993
w194994	130	.4	5.0	.55L	.91L	2.6	27	8.2	1.2	7.1	w194994
w194995	99	.4	6.0	.85L	1.4L	1.9	42	12	1.3	16	w194995
w194996	120	.4	3.0L	.29L	.48L	1.3	13	4.4	.6	8.6	w194996
w194997	94	.5	7.0	1.4L	2.3L	2.4	45	9.0	2.0	14	w194997
w194998	57	.2	3.0L	.16L	.26L	.80	7.3	3.5	.4	3.3	w194998
w194999	48	.5	6.0	.26L	.44L	2.6	8.7	6.5	1.8	12	w194999
w195000	120	.5	3.0L	.20L	.33L	1.8	21	13	1.8	4.6	w195000
w195001	65	.2	3.0L	.42	.53L	1.4	16	6.5	.8	5.7	w195001
w195002	59	.2	3.0L	.12L	.20L	.90	6.2	3.3	.5	1.8	w195002
w195003	74	.4	6.0	.70L	1.2L	2.7	44	14	2.1	46	w195003
w195004	66	.2	3.0L	.22L	.36L	1.1	11	7.9	.9	15	w195004
w195009	26	.3	3.0L	.22L	.36L	2.0	14	9.4	1.7	66	w195009
w195010	68	.3	3.0L	.19L	.31L	2.3	15	11	1.4	51	w195010
w195011	70	.3	3.0L	2.0	.51L	1.9	26	8.8	1.0	27	w195011
w195012	84	.4	3.0L	.09L	.29	1.9	8.4	11	2.0	2.5	w195012
w195013	67	.2	3.0L	.14L	.23L	1.3	7.2	5.0	.6	13	w195013
w195014	87	.3	3.0L	.20L	.34L	1.5	14	9.4	.9	7.4	w195014
w195015	87	.2	3.0L	.19L	.29L	1.0	6.4	7.0	.6	6.4	w195015
w195016	230	.8	4.0L	.62L	1.0L	1.6	31	29	2.1	64	w195016
w195017	100	.4	3.0L	.32L	.53L	2.8	22	9.0	1.2	9.3	w195017

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Zr-S (ppm)
w194974	9.8
w194975	6.4
w194976	10
w194977	4.8
w194978	9.7
w194979	23
w194980	3.7
w194981	5.4
w194982	3.6
w194983	7.0
w194984	11
w194985	9.8
w194986	16
w194987	2.0
w194988	12
w194989	7.7
w194990	4.7
w194991	24
w194992	35
w194993	23
w194994	27
w194995	40
w194996	15
w194997	32
w194998	8.8
w194999	23
w195000	14
w195001	16
w195002	2.7
w195003	20
w195004	17
w195009	4.9
w195010	26
w195011	20
w195012	2.2
w195013	4.3
w195014	32
w195015	9.3
w195016	80
w195017	12

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Virginia reported on whole-coal basis--continued

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w195018	3.0	2.1	0.091	0.035	0.030	0.16	0.19	0.10	0.02	2.0	w195018
w195019	1.9	.80	.075	.018	.030	.071	.19	.083	.04	2.0	w195019
w195020	.38	.31	.45	.015	.010	.031	.60	.023	.02	4.0	w195020
w195034	.88	.60	.066	.015	.020	.052	.32	.048	.05	12	w195034
w195035	2.7	1.5	.060	.056	.020	.35	.37	.076	.03	3.0	w195035
w195036	.33	.25	.066	.012	.020	.020	.058	.017	.02	1.0	w195036
w195037	.78	.46	.071	.016	.010	.012	.089	.046	.03	2.0	w195037
w195038	.94	.82	.061	.014	.010	.057	.11	.041	.04	3.0	w195038
w195039	1.1	.71	.051	.023	.030	.12	.28	.040	.02	7.0	w195039
w195040	3.9	2.1	.076	.035	.030	.18	.27	.19	.07	1.0	w195040
w195041	2.1	1.2	.025	.026	.010	.22	.099	.13	.02	4.0	w195041
w195042	3.1	1.7	.068	.034	.020	.16	.18	.12	.05	1.0L	w195042
w195043	1.7	1.0	.066	.025	.020	.060	.17	.079	.03	1.0	w195043
w195044	2.8	1.8	.13	.033	.030	.10	1.5	.14	.07	11	w195044
w195045	2.6	1.4	.25	.030	.010	.056	.18	.16	.01	1.0	w195045
w195046	1.7	1.3	.061	.033	.020	.19	.36	.061	.03	16	w195046
w195047	1.3	.92	.037	.026	.020	.19	.13	.047	.03	2.0	w195047
w195048	.41	.29	.027	.007	.030	.032	.34	.016	.02	8.0	w195048
w195049	2.1	1.9	.038	.067	.020	.17	.31	.052	.04	5.0	w195049
w195050	4.6	1.9	.041	.031	.030	.21	.17	.25	.01L	2.0	w195050
w195051	2.0	1.2	.046	.036	.030	.20	.73	.063	.09	11	w195051
w195052	1.7	1.1	.077	.024	.010	.073	.16	.072	.04	1.0	w195052
w195053	2.2	1.1	.14	.061	.020	.25	3.7	.071	.03	26	w195053
w195054	.72	.51	.082	.021	.020	.054	.17	.028	.05	2.0	w195054
w195055	.41	.33	.064	.013	.010	.035	.13	.015	.02	2.0	w195055
w195056	1.7	1.1	.081	.025	.020	.11	1.3	.068	.05	29	w195056
w195057	2.5	1.5	.078	.030	.020	.17	.47	.10	.04	9.0	w195057
w195058	1.0	.65	.21	.017	.020	.059	.12	.037	.01	1.0	w195058
w195059	2.2	1.4	.056	.037	.020	.17	.18	.12	.04	3.0	w195059
w195060	1.6	1.0	.049	.027	.020	.089	.22	.068	.03	3.0	w195060
w195061	2.3	1.0	.045	.018	.020	.11	.14	.088	.03	1.0	w195061
w195062	3.5	1.7	.062	.044	.030	.16	.38	.16	.05	5.0	w195062
w195063	2.6	2.1	.065	.054	.020	.38	.38	.076	.07	6.0	w195063
w195064	3.8	2.4	.057	.062	.020	.37	.98	.14	.08	38	w195064
w195066	.67	.43	.062	.013	.040	.047	.10	.027	.02	8.0	w195066
w195067	2.3	1.5	.12	.063	.040	.34	.42	.091	.05	8.0	w195067
w195068	1.7	1.0	.10	.027	.030	.10	.45	.070	.04	7.0	w195068
w195005	3.7	2.2	.043	.045	.040	.29	.28	.18	.03	2.0	w195005
w195006	2.1	1.6	.064	.040	.040	.26	.23	.072	.06	5.0	w195006
w195007	.88	.84	.052	.011	.020	.033	.21	.044	.03	4.0	w195007

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Au-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Bi-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w195018	1.2L	23	67	2.0	1.7L	0.12	30	3.0	15	0.7	w195018
w195019	.7L	18	34	5.8	1.0L	.02	15	2.6	7.3	.3	w195019
w195020	.4L	7.0	36	6.2	.6L	.03	6.0	4.8	4.2	.2	w195020
w195034	.4L	50	26	1.9	.6L	.04	9.0	4.6	7.2	.2	w195034
w195035	1.1L	30	71	3.5	1.6L	.02	12	5.7	14	1.7	w195035
w195036	.2L	5.1	32	2.0	.3L	.02	5.0	4.5	2.7	.5L	w195036
w195037	.3L	22	16	4.5	.5L	.02	8.0	5.4	5.8	.5L	w195037
w195038	.4L	7.3	31	2.8	.6L	.02	13	6.5	8.1	.3	w195038
w195039	.5L	11	62	1.0	.7L	.04	11	5.0	8.5	.4	w195039
w195040	1.4L	27	59	1.7	2.1L	.08	28	8.7	29	1.0	w195040
w195041	.8L	11	39	1.4	1.2L	.03	15	3.6	13	.5	w195041
w195042	1.1L	11	280	7.0	1.7L	.05	13	18	28	.7	w195042
w195043	.7L	11	86	.8	1.0L	.03	14	4.2	9.9	.4	w195043
w195044	1.3L	9.4	58	5.1	2.0L	.16	26	5.3	20	.5	w195044
w195045	1.0L	19	51	2.0	1.5L	.06	22	7.2	19	.2	w195045
w195046	.8L	24	42	1.8	1.2L	.10	15	4.6	12	1.1	w195046
w195047	.6L	5.5	170G	12	.8L	.02	11	23	9.5	.7	w195047
w195048	.2L	4.1	29	2.2	.4L	.05	4.0	4.3	2.6	.1	w195048
w195049	1.0L	7.2	95	4.9	1.4L	.12	27	9.4	16	.9	w195049
w195050	1.5L	14	110	1.3	2.2L	.05	34	3.4	24	.8	w195050
w195051	.9L	11	76	1.0	1.3L	.03	13	3.7	10	1.0	w195051
w195052	.7L	34	52	3.4	1.0L	.04	14	2.4	13	.3	w195052
w195053	1.5L	33	40	5.8	2.2L	.04	15	2.0	11	1.0	w195053
w195054	.4L	9.4	110G	5.4	.5L	.02	7.0	5.4	4.6	.3	w195054
w195055	.2L	22	22	1.2	.3L	.02	4.0	4.2	2.9	.3	w195055
w195056	.9L	11	37	3.2	1.3L	.04	11	5.1	9.0	.8	w195056
w195057	1.0L	14	89	4.3	1.5L	.05	16	6.1	14	1.3	w195057
w195058	.4L	9.2	31	2.9	.7L	.05	9.0	4.6	5.7	.3	w195058
w195059	.9L	11	180	3.4	1.3L	.06	18	5.2	15	.6	w195059
w195060	.6L	13	61	1.6	.9L	.03	13	3.8	9.8	.6	w195060
w195061	.8L	14	36	3.9	1.2L	.03	15	4.6	11	.4	w195061
w195062	1.3L	18	53	2.1	1.9L	.10	18	8.9	18	.5	w195062
w195063	1.2L	14	72	2.3	1.7L	.20	20	24	20	2.2	w195063
w195064	1.6L	22	68	1.7	2.4L	.11	27	7.2	21	1.8	w195064
w195066	.3L	9.0	96	5.1	.5L	.02	6.0	6.3	5.5	.2	w195066
w195067	1.0L	21	82	4.3	1.5L	.06	17	8.9	14	1.0	w195067
w195068	.7L	14	66	2.7	1.1L	.03	11	4.9	8.9	.5	w195068
w195005	1.4L	29	50	2.7	2.1L	.10	24	8.3	25	1.4	w195005
w195006	.9L	37	48	3.5	1.4L	.03	12	14	23	.8	w195006
w195007	.4L	52	12	1.7	.6L	.03	12	10	9.7	.2L	w195007

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	Sample number
w195018	12	3.5	1.9	0.38	82	9.6	2.8	1.2	2.1	0.14	w195018
w195019	7.3	2.3	1.3	.28	94	4.1	1.6	1.9	.7	.11	w195019
w195020	12	1.2	.4L	.17	45	6.6	1.2	2.1	.2	.13	w195020
w195034	17	.9L	.4L	.20	30	4.6	.59	3.1	.4	.45	w195034
w195035	12	2.3L	1.4	.42	110	13	1.8	4.9	.6	.080	w195035
w195036	7.8	.4	.3	.13	48	1.7	.39	.36	.1	.070	w195036
w195037	12	.7L	.4	.19	28	2.0	.51	.61	.4	.080	w195037
w195038	18	.9L	.5	.24	40	3.4	.77	2.1	.4	.10	w195038
w195039	13	1.1L	.5L	.31	37	3.3	.58	.72	.3	.030	w195039
w195040	23	3.1L	1.4L	.50	92	6.3	1.7	.29	1.8	.14	w195040
w195041	14	1.7L	.8L	.24	42	5.5	.87	.32	.8	.17	w195041
w195042	26	2.5L	1.4	.44	20L	17	1.8	13	1.0	.11	w195042
w195043	14	1.5L	.7L	.24	20L	3.5	.99	.20	.9	.020	w195043
w195044	45	2.9L	1.3L	.42	51	6.6	.92L	.79	1.2	.36	w195044
w195045	16	2.2L	1.1	.29	28	5.8	1.6	.78	1.3	.21	w195045
w195046	15	1.7L	.8L	.29	43	5.1	1.2	1.0	.5	.33	w195046
w195047	21	1.9	1.3	.35	50	10	1.5	6.7	.4	.10	w195047
w195048	9.1	.6	.4	.14	20L	2.4	.48	2.9	.1	.12	w195048
w195049	24	2.2	1.0L	.60	58	10	1.1	3.8	.7	.24	w195049
w195050	25	3.2L	1.5L	.49	56	7.3	2.0	.29L	2.2	.33	w195050
w195051	10	1.9L	.9L	.26	44	4.4	.61L	.17	.5	.37	w195051
w195052	19	1.5L	1.0	.32	40	4.2	1.5	6.2	.6	.15	w195052
w195053	18	3.3L	1.5L	.28	68	9.7	1.0L	1.9	.6	.49	w195053
w195054	9.7	.8L	.6	.16	29	4.7	.65	.79	.3	.070	w195054
w195055	6.8	.5L	.3	.14	21	2.2	.51	.86	.1	.11	w195055
w195056	12	1.9L	.9L	.20	56	3.7	1.1	.26	.6	.18	w195056
w195057	14	2.2L	1.0L	.31	44	6.5	1.2	1.9	.8	.11	w195057
w195058	13	1.1	.7	.22	21	2.2	.97	.66	.3	.28	w195058
w195059	22	1.9L	.9L	.33	40	6.7	1.0	3.5	.9	.45	w195059
w195060	11	1.4L	.6L	.20	29	3.5	.69	.88	.6	.10	w195060
w195061	12	1.7L	.8L	.30	40	3.4	1.2	.54	.6	.080	w195061
w195062	21	2.8L	1.3L	.32	96	6.1	1.5	.38	1.2	.16	w195062
w195063	32	2.6L	1.2L	.38	76	3.9	1.2	.70	.6	.21	w195063
w195064	27	3.5L	1.6L	.47	96	8.1	1.6	.32L	1.0	.26	w195064
w195066	3.0	1.0	.6	.16	48	4.2	.72	1.6	.2	.81	w195066
w195067	20	2.2L	1.0L	.41	88	11	1.2	3.0	.6	.16	w195067
w195068	12	1.6L	.7	.18	300	3.7	1.1	.95	.6	.26	w195068
w195005	22	3.1L	1.4L	.44	62	5.3	1.4	.42	1.2	.030	w195005
w195006	24	2.2	1.7	.33	78	9.2	1.1	3.3	.6	.080	w195006
w195007	17	1.1	.6	.33	30	1.9	.65	.30	.4	.090	w195007

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Ho-S (ppm)	In-S (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Sample number
w195018	0.81L	0.81L	17	19	0.3	5.1	0.70	3.4	15	5.1	w195018
w195019	.59	.46L	9	6.5	.2	3.8	.46	2.6	9.2	6.6	w195019
w195020	2.7L	.27L	3	5.1	.1	5.5	.39	.70	4.7	5.9	w195020
w195034	.29L	.29L	5	8.8	.1	3.6	.84	.71	4.6	13	w195034
w195035	.74L	.74L	6	15	.3	8.2	.74	1.3	7.7	17	w195035
w195036	.12L	.12L	2	2.9	.1	3.4	.24	.20	1.7	6.5	w195036
w195037	.22L	.22L	4	3.8	.1	1.9	.35	.96	1.5L	11	w195037
w195038	.30L	.30L	7	12	.1	2.6	.13	.73	5.6	9.5	w195038
w195039	.34L	.34L	5	7.7	.1	3.1	.62	.53	3.6	7.2	w195039
w195040	1.0L	1.0L	16	24	.3	4.3	2.3	2.1	9.9	17	w195040
w195041	.55L	.55L	8	9.5	.1	3.3	.71	2.9	5.8	7.9	w195041
w195042	.80L	.80L	6	26	.3	4.0	.34	3.3	10	40	w195042
w195043	.46L	.46L	8	14	.1	2.5	.40	1.7	6.1	15	w195043
w195044	.92L	.92L	15	25	.2	26	5.0	3.0	12	11	w195044
w195045	.69L	.69L	13	9.8	.1	28	1.5	3.4	6.1	12	w195045
w195046	.55L	.55L	9	12	.1	4.8	2.3	.55	7.4	9.4	w195046
w195047	.50	.39L	5	7.8	.2	4.3	1.2	.84	7.8	32	w195047
w195048	.24	.17L	2	2.9	.1	5.0	.60	.31	2.6	13	w195048
w195049	.67L	1.2	14	26	.3	4.1	1.4	.57	7.6	16	w195049
w195050	1.0L	1.0L	19	20	.3	3.2	.73	5.7	18	14	w195050
w195051	.61L	.61L	7	10	.1	6.4	.87	.87	4.0L	5.5	w195051
w195052	.47L	.47L	7	15	.2	2.9	.20	2.5	8.0	4.4	w195052
w195053	1.0L	1.0L	9	12	.2	180	2.4	.75	6.9L	5.7	w195053
w195054	.25L	.25L	4	5.8	.1	4.3	.32	.54	3.4	9.4	w195054
w195055	.15L	.15L	2	4.0	.1	3.3	.90	.18	1.4	7.5	w195055
w195056	.61L	.61L	6	11	.1	7.7	.70	.52	4.0L	7.7	w195056
w195057	.69L	.69L	9	14	.1	4.3	.20L	1.9	6.4	14	w195057
w195058	.31	.31L	4	7.0	.1	9.2	.22	1.0	4.4	11	w195058
w195059	.61L	.61L	12	17	.1L	4.1	.70	1.8	8.7	9.6	w195059
w195060	.44L	.44L	7	10	.1	2.8	.38	1.6	5.1	6.9	w195060
w195061	.54L	.54L	8	6.5	.1	1.5	.54	2.1	8.5	15	w195061
w195062	.88L	.88L	10	24	.2	6.3	.75	3.9	10	19	w195062
w195063	.81L	.81L	11	19	.2	4.3	3.2	1.2	6.1	16	w195063
w195064	1.1L	1.1L	15	24	.2	9.1	1.9	2.7	13	17	w195064
w195066	.27	.21L	9	3.3	.2	1.0	.57	1.1	2.7	9.3	w195066
w195067	.71L	.71L	9	19	.2	9.4	1.4	.61	8.8	19	w195067
w195068	.51L	.51L	6	13	.1	11	.95	2.0	8.0	11	w195068
w195005	.98L	.98L	16	20	.3	6.4	.98	2.2	8.4	11	w195005
w195006	.64L	.64L	8	15	.4	4.4	1.0	1.1	5.9	20	w195006
w195007	.30L	.30L	7	12	.1	2.5	1.3	.65	3.7	12	w195007

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Virginia reported on whole-coal basis--continued

Sample number	P (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Re-S (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sample number
w195018	20	15	7.9L	29L	1.2L	0.30	4.2	5.3	3.7	2.0	w195018
w195019	6	7.3	4.5L	25L	.66L	.60	2.3	2.2	1.7	.73	w195019
w195020	19	3.1	2.7L	28L	.39L	.60	1.1	3.3	.80	.16	w195020
w195034	18	4.1	2.9L	31L	.42L	.90	1.9	5.1	.90	.13	w195034
w195035	9	7.8	7.2L	32	1.1L	3.7	5.3	2.5	1.7	.21L	w195035
w195036	6	1.7	1.2L	25L	.17L	.20	.80	2.3	.60	.19	w195036
w195037	6	4.2	2.2L	24L	.32L	.40	1.3	3.8	.70	.35	w195037
w195038	2	6.9	2.9L	28L	.43L	.80	2.3	3.6	1.2	.34	w195038
w195039	13	6.7	3.3L	33L	.48L	1.0	2.4	3.6	1.3	.67	w195039
w195040	37	11	9.7L	26	1.4L	.80	6.3	5.8	2.6	.86	w195040
w195041	14	7.9	5.4L	30L	.79L	.40	2.7	7.1	1.4	.71	w195041
w195042	15	15	7.8L	33L	1.1L	1.6	6.5	4.9	2.0	.91	w195042
w195043	9	5.8	4.5L	37L	.66L	.40	2.5	3.1	1.3	.86	w195043
w195044	12	15	9.0L	41L	1.3L	2.2	5.3	7.4	2.1	.26L	w195044
w195045	13	11	6.7L	34L	.98L	.40	3.7	6.2	1.5	.98L	w195045
w195046	14	6.9	5.3L	37L	.78L	.70	2.8	3.1	1.5	.23	w195046
w195047	12	5.5	3.8L	37L	.56L	2.4	3.2	1.3	1.5	.50	w195047
w195048	3	2.2	1.8	35L	.24L	1.1	1.2	3.4	.60	.05L	w195048
w195049	91	12	6.5L	41L	.95L	2.2	5.5	2.2	2.7	.67	w195049
w195050	45	14	9.9L	46L	1.5L	1.3	5.4	4.0	2.5	1.3	w195050
w195051	11	4.6	5.9L	38L	.87L	.80	2.6	3.5	1.2	.17L	w195051
w195052	15	6.6	4.6L	30L	.67L	.40	3.5	4.2	1.5	.54	w195052
w195053	33	6.4	10L	39L	1.5L	.80	3.1	3.2	1.4	.30L	w195053
w195054	11	2.7	2.4L	30L	.36L	.40	1.8	3.5	.80	.07	w195054
w195055	7	2.2	1.5L	26L	.22L	.60	1.3	2.1	.60	.04	w195055
w195056	4	4.0	5.9L	33L	.87L	.40	2.3	4.6	1.1	.17L	w195056
w195057	9	5.9	6.7L	35L	.99L	.30	3.0	4.5	1.3	.20L	w195057
w195058	6	3.4	3.0L	26L	.44L	.40	1.7	3.9	1.0	.35	w195058
w195059	19	10	5.9L	31L	.87L	1.6	4.1	3.6	1.9	.96	w195059
w195060	11	5.5	4.3L	30L	.63L	.30	2.2	3.1	1.1	.25	w195060
w195061	3	6.5	5.2L	27L	.77L	.40	3.3	4.1	1.5	.69	w195061
w195062	27	12	8.5L	33L	1.3L	.90	4.2	4.1	1.6	.50	w195062
w195063	15	13	7.9L	35	1.2L	1.8	5.0	5.0	1.9	.35	w195063
w195064	28	13	11L	32	1.6L	1.2	4.9	11	2.4	.32L	w195064
w195066	5	2.0	2.0L	33L	.30L	1.4	1.9	2.7	1.9	.09	w195066
w195067	9	8.5	6.9L	27	1.0L	1.7	4.1	4.1	2.0	.51	w195067
w195068	19	5.1	5.0L	26L	.73L	.40	2.2	3.9	1.0	.15L	w195068
w195005	31	13	9.5L	20	1.4L	1.3	5.4	5.1	2.7	.84	w195005
w195006	24	18	6.3L	33L	.92L	2.6	8.8	4.8	1.7	.46	w195006
w195007	15	6.9	2.9L	24L	.43L	1.1	2.0	5.4	1.7	.52	w195007

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	Tm-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Sample number
w195018	71	0.6	6.0	0.35L	0.58L	3.7	26	16	1.6	16	w195018
w195019	79	.4	3.0L	.20L	.33L	1.5	11	13	1.1	4.2	w195019
w195020	150	.2	3.0L	.12L	.20L	.80	3.9	8.2	.7	2.4	w195020
w195034	63	.1	3.0L	.13L	.21L	1.1	11	3.7	.4	7.1	w195034
w195035	66	.4	3.0L	.32L	.53L	2.1	23	14	1.6	8.3	w195035
w195036	61	.1	3.0L	.05L	.09L	.50	3.2	2.6	.3	1.3	w195036
w195037	54	.1	3.0L	.10L	.16L	.80	6.4	3.5	.5	2.3	w195037
w195038	77	.2	3.0L	.13L	.22L	1.3	12	4.7	.4	7.3	w195038
w195039	72	.3	3.0L	.14L	.24L	1.9	12	2.6	.7	5.8	w195039
w195040	92	.4	13	.72	.72L	2.8	29	7.7	1.3	4.3	w195040
w195041	34	.2	3.0L	.24L	.40L	1.0	21	4.0	.7	5.5	w195041
w195042	110	.5	3.0L	.34L	.57L	2.7	50	13	1.5	9.9	w195042
w195043	110	.2	3.0L	.20L	.33L	1.3	9.9	4.6	.7	2.4	w195043
w195044	130	.3	3.0L	.40L	.66L	2.8	24	8.7	1.1	8.4	w195044
w195045	69	.2	3.0L	.29L	.49L	1.5	16	8.0	.9	3.6	w195045
w195046	51	.2	3.0L	1.3	.39L	1.1	19	6.2	.8	17	w195046
w195047	67	.4	3.0L	.17L	.28L	1.2	17	13	1.4	7.3	w195047
w195048	43	.1	3.0L	.07L	.12L	.90	5.8	3.4	.4	6.7	w195048
w195049	100	.5	3.0L	.29L	.48L	2.8	31	8.5	1.7	25	w195049
w195050	91	.3	6.0	.44L	.73L	2.9	29	11	1.6	7.6	w195050
w195051	61	.2	3.0L	1.3	.44L	1.3	13	2.4	.6	7.8	w195051
w195052	74	.3	3.0L	.20L	.34L	2.1	21	11	1.1	6.7	w195052
w195053	66	.2	3.0L	.45L	.75L	1.4	14	7.2	.9	6.9	w195053
w195054	100	.1	3.0L	.11L	.18L	.70	8.6	5.8	.6	2.7	w195054
w195055	70L	.1	3.0L	.07L	.11L	.80	4.2	3.3	.5	3.5	w195055
w195056	66	.1	3.0L	.26L	.44L	1.0	9.6	2.6	.6	5.0	w195056
w195057	120	.2	3.0L	.30L	.50L	1.2	17	5.0	.7	5.5	w195057
w195058	79	.2	3.0L	.13L	.22L	1.2	10	7.5	.7	4.0	w195058
w195059	71	.3	3.0L	.26L	.44L	2.2	20	7.2	1.4	14	w195059
w195060	94	.2	3.0L	.19L	.32L	1.0	13	4.2	.5	2.0	w195060
w195061	76	.2	3.0L	.23L	.39L	1.3	18	7.3	.8	1.7	w195061
w195062	100	.3	3.0L	.38L	.63L	2.0	26	10	1.0	20	w195062
w195063	68	.3	3.0L	.35L	.58L	2.7	20	8.7	1.1	35	w195063
w195064	60	.3	3.0L	5.2	.80L	3.0	37	9.1	1.1	10	w195064
w195066	120	.2	3.0L	.09L	.15L	.70	7.5	7.2	1.1	2.0	w195066
w195067	140	.3	3.0L	.30L	.51L	1.9	25	6.6	1.2	35	w195067
w195068	210	.1	3.0L	.22L	.37L	1.3	17	6.5	.5	3.1	w195068
w195005	34	.3	3.0L	.42L	.70L	2.2	24	9.9	1.6	4.5	w195005
w195006	50	.4	3.0L	.28L	.46L	2.8	34	14	2.5	6.1	w195006
w195007	37	.3	3.0L	.13L	.22L	1.2	11	5.6	.9	3.7	w195007

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Zr-S (ppm)
w195018	68
w195019	27
w195020	11
w195034	4.6
w195035	11
w195036	2.2
w195037	6.7
w195038	6.9
w195039	3.0
w195040	17
w195041	17
w195042	21
w195043	15
w195044	18
w195045	35
w195046	7.3
w195047	8.4
w195048	3.1
w195049	5.9
w195050	61
w195051	5.7
w195052	21
w195053	10
w195054	9.7
w195055	2.4
w195056	4.6
w195057	9.7
w195058	9.7
w195059	11
w195060	10
w195061	15
w195062	25
w195063	23
w195064	17
w195066	18
w195067	7.0
w195068	20
w195005	22
w195006	16
w195007	4.7

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w195008	5.3	1.7	0.64	0.040	0.040	0.47	0.21	0.12	0.04	1.0	w195008
w195033	1.5	1.1	.089	.047	.020	.24	.34	.040	.04	5.0	w195033
w195021	.71	.47	.063	.013	.030	.028	.29	.037	.02	31	w195021
w195022	2.1	1.8	.080	.055	.030	.28	.31	.072	.07	11	w195022
w195023	1.8	1.3	.067	.024	.020	.052	.14	.091	.02	1.0	w195023
w195024	1.2	.75	.039	.020	.020	.073	.096	.061	.05	1.0	w195024
w195025	1.5	1.3	.091	.039	.030	.15	.24	.043	.06	2.0	w195025
w195026	1.1	.69	.067	.044	.040	.16	.36	.031	.06	6.0	w195026
w195027	1.3	1.1	.081	.029	.040	.10	.20	.036	.06	3.0	w195027
w195028	.88	.59	.086	.031	.040	.10	.29	.026	.04	5.0	w195028
w195029	1.6	.90	.091	.024	.040	.076	.13	.073	.03	2.0	w195029
w195030	1.9	.74	.069	.014	.010	.032	.12	.11	.04	1.0	w195030
w195031	1.1	.86	.051	.013	.010	.060	.082	.030	.05	2.0	w195031
w195032	3.0	1.7	.069	.031	.020	.13	.21	.14	.03	7.0	w195032

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Au-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Bi-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w195008	1.9L	32	81	1.5	2.8L	0.08	30	3.6	37	1.0	w195008
w195033	.7L	48	50	2.1	1.0L	.07	14	14	11	.8	w195033
w195021	.3L	11	26	3.4	.5L	.04	8.0	4.8	6.0	.1	w195021
w195022	.9L	15	70	3.2	1.4L	.09	19	14	18	.8	w195022
w195023	.7L	13	30	1.9	1.1L	.02	16	5.1	12	.2	w195023
w195024	.5L	6.0	30	2.4	.7L	.03	11	8.5	8.9	.3	w195024
w195025	.7L	13	110	2.4	1.1L	.10	28	5.0	11	.8	w195025
w195026	.5L	11	62	2.0	.8L	.05	10	6.6	8.7	.9	w195026
w195027	.6L	15	84	2.0	.9L	.06	20	6.1	8.7	.6	w195027
w195028	.4L	10	52	1.8	.6L	.06	9.0	5.1	7.5	.7	w195028
w195029	.6L	12	73	1.5	.9L	.04	12	3.4	9.5	.4	w195029
w195030	.6L	26	63	8.3	1.0L	.03	15	8.4	11	.2	w195030
w195031	.5L	44	18	2.9	.7L	.04	9.0	19	9.7	.2	w195031
w195032	1.1L	35	40	1.2	1.7L	.04	18	4.7	18	.5	w195032

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	Sample number
w195008	34	4.1L	1.9L	0.47	130	4.5	1.9	0.38L	2.3	0.050	w195008
w195033	15	1.5L	.7L	.28	64	5.0	1.0	.97	.4	.16	w195033
w195021	14	1.3	.7	.17	54	4.1	.95	1.3	.3	.19	w195021
w195022	33	2.0L	1.3	.49	170	10	2.1	.56	.5	.42	w195022
w195023	14	1.6L	1.0	.27	34	3.6	1.4	.58	.8	.11	w195023
w195024	15	1.0L	.6	.17	74	4.6	.74	2.8	.5	.10	w195024
w195025	31	2.3	1.1	.45	170	5.7	1.6	.92	.3	.19	w195025
w195026	15	1.1L	.6	.22	64	6.2	.83	9.9	.2	.22	w195026
w195027	41	2.2	1.0	.33	80	5.3	1.3	.60	.3	.080	w195027
w195028	9.9	1.2	.5	.21	56	5.6	.90	9.5	.2	.090	w195028
w195029	12	1.3L	.7	.21	30	3.3	.79	.18	.6	.020	w195029
w195030	15	1.4L	.8	.26	28	5.4	.90	2.4	1.0	.090	w195030
w195031	14	1.4	.9	.34	34	5.0	1.2	1.2	.3	.060	w195031
w195032	11	2.5L	1.1L	.33	51	4.9	1.2	.23	.9	.16	w195032

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Ho-S (ppm)	In-S (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Sample number
w195008	1.3L	1.3L	21	41	0.3	5.8	0.56	6.6	10	8.1	w195008
w195033	.48L	.48L	7	11	.2	9.0	3.2	.48	7.6	12	w195033
w195021	.34	.24L	4	6.1	.1	2.2	.88	1.5	4.1	8.8	w195021
w195022	.65L	.65L	9	24	.2	5.6	1.3	1.4	12	24	w195022
w195023	.50L	.50L	9	16	.1	2.9	.58	4.0	10	9.4	w195023
w195024	.32L	.32L	6	6.0	.1	2.9	.23	1.7	6.4	17	w195024
w195025	.50L	.50L	15	14	.2	4.5	2.3	.85	16	7.8	w195025
w195026	.36L	.36L	5	7.8	.1	6.2	1.4	.73	4.2	13	w195026
w195027	.42L	.42L	10	16	.1	3.4	2.5	.72	9.0	16	w195027
w195028	.30	.30L	4	6.5	.1	5.2	2.2	1.0	4.0	9.9	w195028
w195029	.43L	.43L	7	7.9	.1	5.3	.49	1.5	6.0	8.5	w195029
w195030	.45L	.45L	8	9.6	.1	5.8	1.3	4.0	9.0	26	w195030
w195031	.36	.32L	4	9.0	.2	2.7	1.5	.45	6.3	18	w195031
w195032	.79L	.79L	10	24	.1	5.2	.79	2.9	11	16	w195032

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	P (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Re-S (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sample number
w195008	460	18	13L	24	1.9L	0.30	6.6	9.5	2.7	0.75	w195008
w195033	27	6.8	4.7L	17	.69L	1.1	3.8	3.5	1.5	.21	w195033
w195021	19	3.3	5.1L	33L	.34L	1.0	1.6	3.6	.80	.07	w195021
w195022	28	15	14L	41L	.93L	1.8	4.4	7.2	2.4	.65	w195022
w195023	16	8.6	4.9L	33L	.72L	.80	2.7	5.4	1.4	.65	w195023
w195024	4	6.9	3.1L	33L	.46L	.70	1.8	2.8	.90	.60	w195024
w195025	430	6.5	4.9	49L	.71L	1.1	2.9	1.5	2.5	.43	w195025
w195026	27	5.7	3.5L	43L	.52L	1.9	2.9	1.0	1.0	.10	w195026
w195027	200	7.2	4.1L	44L	.60L	.80	4.0	1.8	1.8	.24	w195027
w195028	54	4.2	2.9L	39L	.43L	2.3	2.8	1.1	1.0	.09	w195028
w195029	11	6.1	4.1L	39L	.61L	.50	2.2	3.7	1.0	.67	w195029
w195030	6	6.4	4.4L	30L	.64L	.60	2.5	3.6	1.2	.77	w195030
w195031	14	5.0	3.1L	30L	.45L	.60	3.3	3.9	1.5	.32	w195031
w195032	20	9.0	7.7L	33L	1.1L	.30	3.9	4.9	1.5	.79	w195032

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	Tm-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Sample number
w195008	180	0.4	6.0	0.56L	0.94L	2.6	26	10	1.5	6.4	w195008
w195033	76	.3	3.0L	.21L	.35L	1.7	21	5.9	.9	12	w195033
w195021	120	.2	3.0L	1.1	.17L	1.1	7.8	8.2	.6	3.0	w195021
w195022	120	.4	3.0L	.28L	.47L	2.7	37	12	1.1	11	w195022
w195023	100	.3	3.0L	.22L	.36L	1.3	17	12	.7	3.3	w195023
w195024	69	.1	3.0L	.14L	.23L	.90	12	6.9	.6	6.4	w195024
w195025	430	.3	3.0L	.21L	.36L	2.0	29	9.9	.8	13	w195025
w195026	210	.2	3.0L	.68	.26L	1.7	20	5.0	.6	21	w195026
w195027	260	.3	3.0L	.36	.30L	1.7	28	8.4	.7	7.2	w195027
w195028	180	.2	6.0	.13L	.22L	1.4	20	5.2	.5	28	w195028
w195029	120	.2	3.0L	.18L	.31L	1.2	15	5.9	.5	3.1	w195029
w195030	77	.2	3.0L	.19L	.32L	1.0	14	7.7	.7	4.5	w195030
w195031	45	.3	3.0L	.14L	.23L	1.5	16	9.5	1.1	9.9	w195031
w195032	90	.2	3.0L	.34L	.57L	1.1	19	7.0	.7	3.4	w195032

Table 8h.--Major, minor, and trace element composition of 254 bituminous coal samples from West Viginia reported on whole-coal basis--continued

Sample number	Zr-S (ppm)
w195008	70
w195033	4.9
w195021	17
w195022	12
w195023	58
w195024	14
w195025	8.5
w195026	5.1
w195027	8.4
w195028	6.9
w195029	14
w195030	38
w195031	8.6
w195032	19

Summary of the analytical data on 83 Virginia bituminous coal samples

Analytical data on 45 Virginia coal samples were published by Swanson and others (1976) and on 72 Virginia coal samples by Zubovic and others (1979). The generalized distribution of the 83 samples of this report is shown on figure 7. The statistical data on these coal samples are reported in tables 9a, b and c; the analytical data in tables 9e, f, h and h. Other descriptive and location information is presented in table 9d. The 83 samples were collected from 35 different coal beds. The 11 samples of the Blair coal bed are the largest number of samples collected from a single coal bed.

In the following paragraphs the geometric means for each of the components in the Virginia coal samples are compared with those of the 644 bituminous coal samples of this report.

Comparison of the geometric means, (table 9a), for the proximate and ultimate analyses shows a similarity in the average moisture, volatile matter, hydrogen and nitrogen contents of the coals in the two sets of samples. The mean values for fixed carbon and carbon are higher, whereas, those for ash, oxygen and sulfur are lower in the Virginia coal samples. The geometric means for heat of combustion, ash-fusion temperatures and free-swelling index are also higher for the Virginia coal samples.

The geometric means for the major oxides, SiO_2 and Al_2O_3, are about equal in the two sets of data (table 9b). The alkali metal oxides and alkaline earths are higher in the Virginia coal ash samples, whereas, Fe_2O_3 and P_2O_5 are lower.

The geometric means for the 38 trace elements (table 9c) are higher for Ba, Cs, Cu, F, Mn, Sr and U in the Virginia coal samples. Cerium,

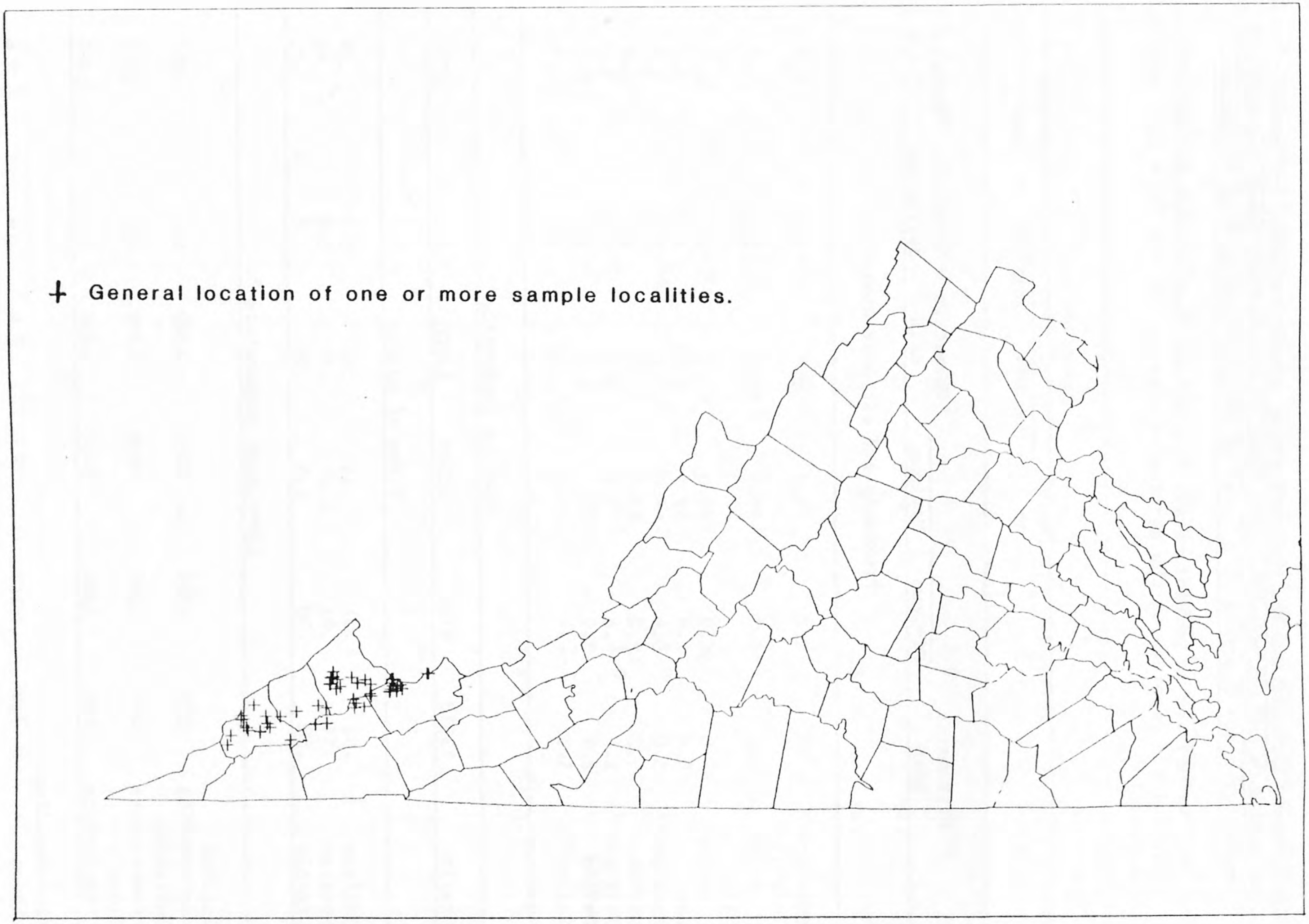

Figure 7.--Distribution of Virginia bituminous coal samples.

Table 9a.-- Arithmetic mean, observed range, geometric mean, and geometric deviation of proximate and ultimate analysis, heat of combustion, forms of sulfur, ash-fusion temperatures and free-swelling index of 63 coal samples from Virginia.

[All values are in percent except Btu/lb, ash-fusion temperatures and free-swelling index and are reported on the as-received basis. °F = 9/5°C + 32; Kcal/kg = 0.556 (Btu/lb).]

	Arithmetic mean	Observed range Minimum	Observed range Maximum	Geometric mean	Geometric deviation	Geometric mean 548 samples
Proximate and ultimate analyses						
Moisture	2.8	0.8	7.0	2.5	1.6	2.5
Volatile matter	28.8	15.3	39.5	28.3	1.2	28.1
Fixed carbon	57.8	36.9	76.0	57.3	1.1	54.7
Ash	10.6	1.9	39	8.65	1.9	9.7
Hydrogen	5.0	3.6	6.0	4.9	1.1	4.9
Carbon	75.2	49.2	83.8	74.9	1.1	71.8
Nitrogen	1.4	.8	1.8	1.3	1.2	1.3
Oxygen	6.8	2.9	10	6.6	1.3	7.1
Sulfur	1.0	.4	5.2	.88	1.6	1.4
Heat of combustion						
Btu/lb	13370	8360	15040	13300	1.1	12730
Forms of sulfur						
Sulfate	.02	.01	.24	.02	2.2	.04
Pyritic	.39	.03	4.2	.22	2.9	.62
Organic	.58	.30	1.3	.59	1.3	.76
Ash-fusion temperature °C						
Initial deformation	1310	1050	1600	1300	1.1	1260
Softening temperature	1340	1100	1600	1340	1.1	1300
Fluid temperature	1400	1160	1600	1390	1.1	1360
Free-swelling Index	7.9	1.0	9.0	7.4	1.6	5.6

Table 9b.--Arithmetic mean, observed range, geometric mean, and geometric deviation of ash content and contents of eleven major and minor oxides in the laboratory ash of 83 coal samples from Virginia.

[All samples were ashed at 525°C; all data except geometric deviation are in percent.]

Oxide	Arithmetic mean	Observed range		Geometric mean	Geometric deviation	Geometric mean 644 samples
		Minimum	Maximum			
(Ash)	12	2.1	44.9	9.34	2.0	9.76
SiO_2	46	14	65	45	1.3	43
Al_2O_3	24	6.2	33	23	1.3	24
CaO	3.3	.44	20	1.9	2.7	1.4
MgO	1.2	.32	2.2	1.1	1.5	.68
Na_2O	.56	.15	1.9	.47	1.7	.34
K_2O	2.7	.38	5.4	2.3	1.9	1.6
Fe_2O_3	11	2.6	41	8.4	1.9	11
MnO	.04	.01	.23	.03	2.1	.02
TiO_2	1.3	.37	2.6	1.2	1.4	1.1
P_2O_5	.21	.02	3.5	.09	2.7	.13
SO_3	3.5	.3	16	2.3	2.5	1.7

Table 9c.--Arithmetic mean, observed range, geometric mean, and geometric deviation of 38 elements in 83 coal samples from Virginia.

[All data are in parts-per-million and are reported on a whole-coal basis; L means less than value shown.]

Element	Arithmetic mean	Observed range Minimum	Observed range Maximum	Geometric mean	Geometric deviation	Geometric mean 644 samples
Ag	0.03	0.006	0.20	0.02	2.7	0.03
As	19	1.0	170	7.9	3.8	8.4
B	11	.81L	35	8.1	2.2	14
Ba	95	19	320	77	1.9	48
Be	1.9	.24	8.0	1.6	1.8	1.9
Cd	.07	.004L	.32	.05	2.4	.07
Ce	19	3.0	70	16	1.9	16
Co	6.8	1.2	16	5.9	1.8	6.2
Cr	15	2.8	56	12	2.0	14
Cs	1.4	.1L	7.1	.90	2.7	.66
Cu	20	5.9	54	18	1.6	15
Eu	.35	.09	.9	.30	1.7	.33
F	140	20L	1900	74	2.6	51
Ga	4.2	.71	13	3.4	1.9	4.8
Ge	1.8	.15L	12	.34	6.1	1.1
Hf	.82	.1L	4.0	.61	2.2	.61
Hg	.21	.01L	.86	.09	4.0	.12
La	11	2.0	41	8.6	2.0	8.8
Li	19	1.2	110	13	2.4	15
Lu	.15	.1L	.4	.13	1.5	.15
Mn	29	2.4	210	19	2.5	14
Mo	1.4	.31L	12	.96	2.2	1.5
Nb	1.7	.17L	9.5	1.1	2.5	1.4
Nd	9.2	1.0L	39	3.9	3.7	4.2
Ni	9.7	1.4	26	8.5	1.7	12
Pb	6.5	1.2L	20	5.1	2.1	7.0
Sb	.88	.2L	2.4	.71	1.9	.73
Sc	3.5	.6	11	2.9	1.9	3.3
Se	2.6	.8L	7.6	2.2	1.8	2.8
Sm	1.8	.4	5.3	1.5	1.8	1.6
Sr	99	25L	270	84	1.8	65
Tb	.27	.1L	.7	.23	1.7	.26
U	2.0	.7	5.8	1.8	1.6	1.3
V	17	2.4	72	13	2.1	16
Y	6.0	1.7	20	5.2	1.7	6.2
Yb	.87	.2	2.3	.76	1.7	.84
Zn	15	2.2	100	9.8	2.4	14
Zr	15	1.4	63	11	2.3	13

Eu, Hf, La, Li, Lu, Nd, Sb, Sm, Tb and Yb are about equal in the two data sets. The other 20 elements are lower in the Virginia coal samples than in the 644 bituminous coal samples of this report.

Table 9d.--Descriptions for 83 bituminous coal samples from Virginia.

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w193932	Virginia	Buchanan	371136n	815216w	Norton	Kennedy	Channel	28.0
w193933	Virginia	Buchanan	371348n	815946w	Lee	Pocahontas No 3	Channel	53.0
w193934	Virginia	Buchanan	371316n	820536w	Lee	Pocahontas No 3	Channel	65.0
w193935	Virginia	Buchanan	371059n	820429w	Lee	Pocahontas No 3	Channel	68.0
w193936	Virginia	Russell	370414n	815845w	Norton	Big fork	Channel	29.0
w194292	Virginia	Buchanan	371401n	820721w	Wise	Dorchester	Channel	33.0
w194293	Virginia	Buchanan	371150n	820831w	Wise	Dorchester	Channel	14.0
w194294	Virginia	Buchanan	371150n	820831w	Wise	Dorchester	Channel	11.0
w194295	Virginia	Buchanan	371540n	820714w	Wise	Blair	Channel	22.0
w194296	Virginia	Buchanan	371540n	820714w	Wise	Blair	Channel	45.0
w194297	Virginia	Buchanan	371537n	820713w	Wise	Blair	Channel	21.0
w194298	Virginia	Buchanan	371349n	820809w	Wise	Blair	Channel	14.0
w194299	Virginia	Buchanan	371349n	820809w	Wise	Blair	Channel	21.0
w194300	Virginia	Buchanan	371349n	820809w	Wise	Glamorgan	Channel	32.0
w194301	Virginia	Buchanan	371024n	820556w	Norton	Splash Dam	Channel	11.0
w194302	Virginia	Buchanan	371359n	820724w	Wise	Eagle	Channel	32.0
w194303	Virginia	Buchanan	371400n	820721w	Wise	Blair	Channel	17.0
w194304	Virginia	Buchanan	371400n	820721w	Wise	Blair	Channel	34.0
w194305	Virginia	Buchanan	371149n	820842w	Wise	Eagle	Channel	41.0
w194852	Virginia	Wise	365929n	823326w	Wise	Clintwood	Channel	21.0
w194853	Virginia	Wise	365852n	824256w	Wise	Low Splint	Channel	50.0
w194854	Virginia	Wise	365301n	824916w	Wise	Kelly	Channel	41.0
w194855	Virginia	Wise	365552n	824754w	Wise	Taggart Marker	Channel	40.0
w193945	Virginia	Russell	370704n	815912w	Norton	Upper Banner	Channel	49.0
w193946	Virginia	Russell	370704n	815912w	Norton	Upper Banner	Channel	9.0
w193947	Virginia	Buchanan	371305n	815431w	Norton	Cary	Channel	21.0
w193948	Virginia	Buchanan	371210n	815736w	Norton	Splash Dam	Channel	13.0
w193949	Virginia	Buchanan	371210n	815736w	Norton	Splash Dam	Channel	44.0
w193950	Virginia	Buchanan	371208n	815738w	Norton	Hagy	Channel	23.0
w193989	Virginia	Tazewell	371501n	812909w	Lee	Pocahontas No 3	Channel	82.0
w193990	Virginia	Tazewell	371502n	812954w	Lee	Pocahontas No 3	Channel	94.0
w196283	Virginia	Wise	365724n	824104w	Wise	Lyons	Channel	26.0
w196284	Virginia	Wise	365819n	824139w	Wise	Imboden	Channel	21.0
w196285	Virginia	Wise	365819n	824139w	Wise	Imboden	Channel	10.0
w196286	Virginia	Wise	365819n	824139w	Wise	Imboden	Channel	10.0

Table 9d.--Descriptions for 83 bituminous coal samples from Virginia--continued

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w196287	Virginia	Wise	365926n	823327w	Wise	Clintwood	Channel	14.0
w196288	Virginia	Wise	365820n	823222w	Wise	Blair	Channel	44.0
w196289	Virginia	Wise	365710n	823618w	Wise	Dorchester	Channel	23.0
w196290	Virginia	Dickenson	370319n	822154w	Norton	Kennedy	Channel	41.0
w195439	Virginia	Lee	365159n	825533w	Wise	Taggart	Channel	38.0
w195440	Virginia	Dickenson	370508n	821307w	Norton	Jawbone	Channel	29.0
w195441	Virginia	Wise	370046n	824351w	Wise	Phillips	Channel	15.0
w195442	Virginia	Wise	370203n	824347w	Wise	High Splint	Channel	44.0
w195443	Virginia	Wise	370058n	824248w	Wise	Phillips	Channel	44.0
w195444	Virginia	Dickenson	370142n	822815w	Norton	Splash Dam	Channel	18.0
w195445	Virginia	Russell	365933n	820946w	Norton	Jawbone	Channel	22.0
w195446	Virginia	Russell	365933n	820946w	Norton	Jawbone	Channel	11.0
w195447	Virginia	Russell	365933n	820946w	Norton	Jawbone	Channel	30.0
w194411	Virginia	Wise	365654n	823620w	Wise	Dorchester	Channel	19.0
w194412	Virginia	Wise	365933n	823323w	Wise	Blair	Channel	32.0
w197299	Virginia	Wise	370529n	823845w	Wise	Blair	Channel	22.0
w197300	Virginia	Wise	370150n	823403w	Wise	Blair	Channel	32.0
w197301	Virginia	Wise	365424n	822419w	Norton	Raven	Channel	19.0
w197302	Virginia	Wise	365424n	822419w	Norton	Raven	Channel	33.0
w197303	Virginia	Russell	365915n	821422w	Norton	Tiller	Channel	37.0
w197304	Virginia	Russell	365915n	821422w	Norton	Tiller	Channel	5.0
w197305	Virginia	Russell	365915n	821422w	Norton	Tiller	Channel	9.0
w197306	Virginia	Russell	365915n	821422w	Norton	Tiller	Channel	37.0
w197308	Virginia	Dickenson	370429n	821004w	Norton	Jawbone	Channel	27.0
w195111	Virginia	Tazewell	371320n	814319w	New River	Lower Castle	Drill Core	
w195112	Virginia	Tazewell	371320n	814319w	New River	Middle Seaboard	Drill Core	
w195113	Virginia	Tazewell	371320n	814319w	New River	Lower Seaboard	Drill Core	
w195114	Virginia	Tazewell	371203n	814401w	New River	Upper Seaboard	Drill Core	
w195115	Virginia	Tazewell	371320n	814401w	New River	Middle Seaboard	Drill Core	
w195116	Virginia	Tazewell	371116n	814320w	New River	Dirty 6	Drill Core	
w195117	Virginia	Tazewell	371116n	814320w	New River	Lower Seaboard	Drill Core	
w195118	Virginia	Tazewell	371115n	814229w	New River	Pocahontas No 12	Drill Core	
w195119	Virginia	Tazewell	371131n	814030w	New River	Middle Horsepen	Drill Core	
w195120	Virginia	Tazewell	371106n	814140w	New River	Middle Horsepen	Drill Core	
w195121	Virginia	Tazewell	371106n	814140w	New River	Pocahontas No 9a	Drill Core	

Table 9d.--Descriptions for 83 bituminous coal samples from Virginia--continued

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w195122	Virginia	Tazewell	370936n	814155w	New River	Middle Seaboard	Drill Core	
w195123	Virginia	Tazewell	370936n	814155w	New River	Middle Seaboard	Drill Core	
w195124	Virginia	Tazewell	370936n	814155w	New River	Middle Horsepen	Drill Core	
w195125	Virginia	Tazewell	371011n	814429w	New River	Dirty 6	Drill Core	
w195126	Virginia	Tazewell	370925n	814449w	New River	Lower Seaboard	Drill Core	
w195127	Virginia	Tazewell	370925n	814449w	New River	Upper Horsepen	Drill Core	
w195128	Virginia	Tazewell	370925n	814449w	New River	Pocahontas No 1½	Drill Core	
w195129	Virginia	Tazewell	371020n	813947w	New River	Upper Horsepen	Drill Core	
w195130	Virginia	Tazewell	371020n	813947w	New River	Pocahontas No 9	Drill Core	
w195133	Virginia	Tazewell	370801n	815208w	New River	Jawbone	Drill Core	
w195134	Virginia	Tazewell	370848n	815236w	Kanawha	Kennedy	Drill Core	
w195135	Virginia	Russell	370551n	815810w	Pocahontas	Pocahontas No 4	Drill Core	
w195137	Virginia	Russell	370449n	815453w	Pocahontas	Pocahontas No 3	Drill Core	

Table 9e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 63 bituminous coal samples from Virginia.

[All analyses except Kcal/kg, Btu, free-swelling index and ash-fusion temperatures in percent. For each sample number, the analyses are reported three ways: first, as-received, second, moisture free, and third, moisture and ash free. All analyses by Coal Analysis Section, Department of Energy, Pittsburgh, Pa. B, not determined. 1600G for ash-fusion temperatures means greater than 1600 C.]

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w193932	2.7	25.0	69.0	3.3	5.1	83.4	1.4	6.1	0.6	8,200	14,750
	---	25.7	70.9	3.4	4.9	85.7	1.4	3.8	.6	8,420	15,160
	---	26.6	73.4	---	5.1	88.7	1.5	3.9	.6	8,720	15,700
w193933	.9	15.6	76.0	7.5	4.3	83.6	1.1	2.9	.6	8,010	14,410
	---	15.7	76.7	7.6	4.2	84.4	1.1	2.1	.6	8,080	14,550
	---	17.0	83.0	---	4.6	91.3	1.2	2.3	.7	8,740	15,740
w193934	.8	17.6	69.2	12.4	4.0	78.4	1.0	3.3	.9	7,480	13,470
	---	17.7	69.8	12.5	3.9	79.0	1.0	2.6	.9	7,540	13,580
	---	20.3	79.7	---	4.5	90.3	1.2	3.0	1.0	8,620	15,520
w193935	1.2	15.3	67.5	16.0	4.0	74.8	1.0	3.3	.9	7,130	12,840
	---	15.5	68.3	16.2	3.9	75.7	1.0	2.3	.9	7,220	12,990
	---	18.5	81.5	---	4.7	90.3	1.2	2.7	1.1	8,610	15,500
w193936	3.3	28.0	53.6	15.1	4.7	70.4	1.0	7.2	1.6	6,880	12,380
	---	29.0	55.4	15.6	4.5	72.8	1.0	4.4	1.7	7,110	12,800
	---	34.3	65.7	---	5.3	86.3	1.2	5.2	2.0	8,430	15,170
w194292	2.3	25.8	55.8	16.1	4.7	71.4	1.4	5.5	1.0	7,060	12,710
	---	26.4	57.1	16.5	4.5	73.1	1.4	3.5	1.0	7,230	13,010
	---	31.6	68.4	---	5.4	87.5	1.7	4.2	1.2	8,650	15,580
w194293	4.5	28.5	59.1	7.9	5.2	77.1	1.5	7.3	1.0	7,650	13,780
	---	29.8	61.9	8.3	4.9	80.7	1.6	3.5	1.0	8,010	14,430
	---	32.5	67.5	---	5.4	88.0	1.7	3.8	1.1	8,740	15,730
w194294	2.4	29.2	63.4	5.0	5.1	81.7	1.5	5.7	.9	8,100	14,570
	---	29.9	65.0	5.1	5.0	83.7	1.5	3.7	.9	8,290	14,930
	---	31.5	68.5	---	5.2	88.2	1.6	3.9	1.0	8,740	15,740
w194295	2.4	25.9	51.5	20.2	4.5	66.8	1.2	6.7	.6	6,620	11,910
	---	26.5	52.8	20.7	4.3	68.4	1.2	4.7	.6	6,780	12,210
	---	33.5	66.5	---	5.5	86.3	1.6	5.9	.8	8,550	15,390
w194296	3.3	29.8	60.6	6.3	5.2	78.6	1.5	7.0	1.3	7,820	14,080
	---	30.8	62.7	6.5	5.0	81.3	1.6	4.2	1.3	8,090	14,560
	---	33.0	67.0	---	5.3	86.9	1.7	4.5	1.4	8,650	15,570
w194297	2.5	27.6	67.0	2.9	5.2	82.5	1.4	7.1	.9	8,180	14,720
	---	28.3	68.7	3.0	5.0	84.6	1.4	5.0	.9	8,390	15,100
	---	29.2	70.8	---	5.2	87.2	1.5	5.2	1.0	8,640	15,560

Table 9e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 63 bituminous coal samples from Virginia--continued

Sample number	Air-dried loss	Forms of sulfur			Free swelling	Ash fusion temperature C		
		Sulfate	Pyritic	Organic		Initial deform.	soften.	fluid
w193932	1.8	0.00	0.06	0.58	9.0	1,245	1,290	1,340
	---	.00	.06	.60				
	---	.00	.06	.62				
w193933	.5	.01	.19	.45	3.5	1,285	1,330	1,370
	---	.01	.19	.45				
	---	.01	.21	.49				
w193934	.4	.01	.38	.47	6.5	1,210	1,265	1,315
	---	.01	.38	.47				
	---	.01	.44	.54				
w193935	.7	.01	.26	.60	4.5	1,495	1,540	1,540
	---	.01	.26	.61				
	---	.01	.31	.72				
w193936	2.1	.03	.89	.66	5.5	1,400	1,450	1,490
	---	.03	.92	.68				
	---	.04	1.09	.81				
w194292	1.4	.01	.38	.58	8.5	1,540	1,540	1,540
	---	.01	.39	.59				
	---	.01	.47	.71				
w194293	3.8	.01	.56	.48	8.0	1,540	1,540	1,540
	---	.01	.59	.50				
	---	.01	.64	.55				
w194294	1.5	.01	.28	.57	9.0	1,490	1,540	1,540
	---	.01	.29	.58				
	---	.01	.30	.62				
w194295	1.5	.01	.12	.50	8.0	1,540	1,540	1,540
	---	.01	.12	.51				
	---	.01	.16	.65				
w194296	2.2	.01	.66	.65	8.5	1,130	1,180	1,245
	---	.01	.68	.67				
	---	.01	.73	.72				
w194297	1.0	.01	.19	.65	9.0	1,185	1,235	1,290
	---	.01	.19	.67				
	---	.01	.20	.69				

Table 9e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash fusion temperature determinations for 63 bituminous coal samples from Virginia--continued

Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
w194298	2.8	29.7	59.3	8.2	5.3	77.4	1.5	6.3	1.2	7,710	13,870
	---	30.6	61.0	8.4	5.1	79.6	1.5	3.9	1.2	7,930	14,270
	---	33.4	66.6	---	5.6	87.0	1.7	4.3	1.3	8,660	15,590
w194299	2.1	31.0	65.0	1.9	5.4	83.8	1.7	6.1	1.2	8,350	15,040
	---	31.7	66.4	1.9	5.3	85.6	1.7	4.3	1.2	8,530	15,360
	---	32.3	67.7	---	5.4	87.3	1.8	4.4	1.2	8,700	15,660
w194300	2.5	25.3	52.9	19.3	4.5	68.1	1.3	6.1	.7	6,720	12,090
	---	25.9	54.3	19.8	4.3	69.8	1.3	4.0	.7	6,890	12,410
	---	32.4	67.6	---	5.4	87.1	1.7	5.0	.9	8,590	15,470
w194301	1.7	25.1	56.2	17.0	4.6	71.4	1.3	4.7	1.0	7,050	12,690
	---	25.5	57.2	17.3	4.5	72.6	1.3	3.2	1.0	7,170	12,910
	---	30.9	69.1	---	5.4	87.8	1.6	3.9	1.2	8,670	15,610
w194302	5.1	25.6	49.3	20.0	4.6	64.3	1.2	8.6	1.2	6,360	11,450
	---	27.0	51.9	21.1	4.3	67.8	1.3	4.3	1.3	6,700	12,060
	---	34.2	65.8	---	5.4	85.8	1.6	5.4	1.6	8,490	15,290
w194303	4.1	21.5	42.7	31.7	3.9	54.4	1.0	7.5	1.3	5,390	9,700
	---	22.4	44.5	33.1	3.6	56.7	1.0	4.0	1.4	5,620	10,110
	---	33.5	66.5	---	5.4	84.7	1.6	6.0	2.0	8,390	15,110
w194304	5.1	28.3	64.2	2.4	5.3	80.1	1.6	9.4	1.0	7,930	14,270
	---	29.8	67.7	2.5	5.0	84.4	1.7	5.1	1.1	8,350	15,040
	---	30.6	69.4	---	5.1	86.6	1.7	5.3	1.1	8,570	15,430
w194305	5.9	27.7	51.5	14.9	4.9	68.1	1.3	9.4	1.5	6,790	12,230
	---	29.4	54.7	15.8	4.5	72.4	1.4	4.4	1.6	7,220	13,000
	---	35.0	65.0	---	5.4	86.0	1.6	5.2	1.9	8,580	15,440
w194852	2.3	33.0	58.5	6.2	5.3	78.4	1.8	5.9	2.5	7,840	14,120
	---	33.8	59.9	6.3	5.2	80.2	1.8	3.9	2.6	8,030	14,450
	---	36.1	63.9	---	5.5	85.7	2.0	4.2	2.7	8,570	15,430
w194853	2.1	34.5	52.9	10.5	5.2	75.0	1.4	7.2	.7	7,460	13,440
	---	35.2	54.0	10.7	5.1	76.6	1.4	5.4	.7	7,630	13,730
	---	39.5	60.5	---	5.7	85.8	1.6	6.1	.8	8,540	15,370
w194854	3.6	33.3	53.8	9.3	5.1	73.7	1.4	9.6	.8	7,270	13,090
	---	34.5	55.8	9.6	4.9	76.5	1.5	6.6	.8	7,540	13,580
	---	38.2	61.8	---	5.4	84.6	1.6	7.3	.9	8,350	15,030
w194855	2.8	35.3	58.8	3.1	5.5	81.2	1.5	8.2	.6	8,040	14,470
	---	36.3	60.5	3.2	5.3	83.5	1.5	5.9	.6	8,270	14,890
	---	37.5	62.5	---	5.5	86.3	1.6	6.1	.6	8,550	15,380

Table 9e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 63 bituminous coal samples from Virginia--continued

Sample number	Air-dried loss	Forms of sulfur: Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C: Initial deform.	soften.	fluid
w194298	1.7	0.09	0.41	0.73	9.0	1,395	1,450	1,510
	---	.09	.42	.75				
	---	.10	.46	.82				
w194299	1.0	.02	.29	.87	9.0	1,175	1,225	1,290
	---	.02	.30	.89				
	---	.02	.30	.91				
w194300	1.6	.02	.15	.56	6.5	1,540	1,540	1,540
	---	.02	.15	.57				
	---	.03	.19	.72				
w194301	1.0	.02	.49	.50	8.0	1,540	1,540	1,540
	---	.02	.50	.51				
	---	.02	.60	.62				
w194302	3.4	.15	.49	.52	9.0	1,520	1,540	1,540
	---	.16	.52	.55				
	---	.20	.65	.69				
w194303	2.8	.02	.76	.53	8.5	1,375	1,435	1,500
	---	.02	.79	.55				
	---	.03	1.18	.83				
w194304	3.7	.02	.26	.76	9.0	1,050	1,100	1,165
	---	.02	.27	.80				
	---	.02	.28	.82				
w194305	4.9	.24	.65	.57	8.5	1,300	1,345	1,400
	---	.26	.69	.61				
	---	.30	.82	.72				
w194852	1.1	.01	1.89	.56	9.0	1,100	1,160	1,225
	---	.01	1.93	.57				
	---	.01	2.07	.61				
w194853	.7	.01	.21	.53	8.0	1,540	1,540	1,540
	---	.01	.21	.54				
	---	.01	.24	.61				
w194854	1.7	.01	.19	.64	5.5	1,540	1,540	1,540
	---	.01	.20	.66				
	---	.01	.22	.73				
w194855	1.2	.01	.14	.42	8.5	1,340	1,395	1,455
	---	.01	.14	.43				
	---	.01	.15	.45				

Table 9e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 63 bituminous coal samples from Virginia--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w193945	2.5	31.9	58.7	6.9	5.3	79.2	1.5	6.4	0.7	7,830	14,100
	---	32.7	60.2	7.1	5.2	81.2	1.5	4.3	.7	8,040	14,460
	---	35.2	64.8	---	5.5	87.4	1.7	4.6	.8	8,650	15,570
w193946	2.9	32.3	57.6	7.2	5.3	78.1	1.5	6.9	1.0	7,760	13,960
	---	33.3	59.3	7.4	5.1	80.4	1.5	4.5	1.0	7,990	14,380
	---	35.9	64.1	---	5.5	86.9	1.7	4.8	1.1	8,630	15,530
w193947	4.6	23.1	66.1	6.2	5.1	79.0	1.4	7.5	.7	7,740	13,930
	---	24.2	69.3	6.5	4.8	82.8	1.5	3.6	.7	8,110	14,600
	---	25.9	74.1	---	5.1	88.6	1.6	3.8	.8	8,680	15,620
w193948	3.4	25.0	64.8	6.8	4.9	79.3	1.3	6.0	1.6	7,820	14,080
	---	25.9	67.1	7.0	4.7	82.1	1.3	3.1	1.7	8,100	14,570
	---	27.8	72.2	---	5.0	88.3	1.4	3.3	1.8	8,710	15,670
w193949	3.6	23.5	63.5	9.4	4.8	77.5	1.4	6.3	.6	7,590	13,670
	---	24.4	65.9	9.8	4.6	80.4	1.5	3.2	.6	7,880	14,180
	---	27.0	73.0	---	5.1	89.1	1.6	3.6	.7	8,730	15,710
w193950	7.0	23.3	58.4	11.3	4.9	71.4	1.2	10.0	1.2	7,000	12,610
	---	25.1	62.8	12.2	4.4	76.8	1.3	4.1	1.3	7,530	13,550
	---	28.5	71.5	---	5.0	87.4	1.5	4.6	1.5	8,570	15,430
w193989	1.9	20.9	67.6	9.6	4.6	79.5	1.2	4.6	.6	7,730	13,910
	---	21.3	68.9	9.8	4.5	81.0	1.2	3.0	.6	7,880	14,180
	---	23.6	76.4	---	5.0	89.8	1.4	3.3	.7	8,730	15,720
w193990	2.0	21.7	67.9	8.4	4.7	80.5	1.2	4.5	.7	7,810	14,060
	---	22.1	69.3	8.6	4.6	82.1	1.2	2.8	.7	7,970	14,340
	---	24.2	75.8	---	5.0	89.8	1.3	3.0	.8	8,720	15,690
w196283	3.9	37.1	53.0	6.0	5.8	75.8	1.4	8.4	2.6	7,640	13,750
	---	38.6	55.2	6.2	5.6	78.9	1.5	5.1	2.7	7,950	14,310
	---	41.2	58.8	---	6.0	84.1	1.6	5.5	2.9	8,480	15,270
w196284	3.6	31.4	52.5	12.5	5.1	71.7	1.3	8.4	.9	7,130	12,840
	---	32.6	54.5	13.0	4.9	74.4	1.3	5.4	.9	7,400	13,320
	---	37.4	62.6	---	5.6	85.5	1.5	6.2	1.1	8,500	15,310
w196285	2.4	39.5	50.0	8.1	6.0	77.0	1.3	7.2	.5	7,810	14,060
	---	40.5	51.2	8.3	5.9	78.9	1.3	5.2	.5	8,000	14,400
	---	44.1	55.9	---	6.4	86.0	1.5	5.7	.6	8,730	15,710
w196286	2.9	28.7	44.7	23.7	4.6	61.8	1.2	8.3	.5	6,120	11,020
	---	29.6	46.0	24.4	4.4	63.6	1.2	5.9	.5	6,300	11,350
	---	39.1	60.9	---	5.8	84.2	1.6	7.8	.7	8,340	15,010

Table 9e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 63 bituminous coal samples from Virginia--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w193945	1.5	0.02	0.17	0.53	9.0	1,420	1,480	1,540
	---	.02	.17	.54				
	---	.02	.19	.58				
w193946	1.6	.03	.33	.63	9.0	1,380	1,435	1,490
	---	.03	.34	.65				
	---	.03	.37	.70				
w193947	3.4	.01	.06	.68	9.0	1,540	1,540	1,540
	---	.01	.06	.71				
	---	.01	.07	.76				
w193948	2.3	.02	.71	.91	9.0	1,270	1,325	1,390
	---	.02	.73	.94				
	---	.02	.79	1.01				
w193949	2.7	.02	.17	.45	9.0	1,520	1,540	1,540
	---	.02	.18	.47				
	---	.02	.20	.52				
w193950	5.8	.03	.40	.76	9.0	1,295	1,365	1,430
	---	.03	.43	.82				
	---	.04	.49	.93				
w193989	1.4	B	B	B	9.0	1,330	1,375	1,430
	---	B	B	B				
	---	B	B	B				
w193990	1.4	B	B	B	9.0	1,320	1,355	1,415
	---	B	B	B				
	---	B	B	B				
w196283	2.6	.08	1.47	1.07	9.0	1,150	1,215	1,265
	---	.08	1.53	1.11				
	---	.09	1.63	1.19				
w196284	2.6	.04	.33	.57	8.0	1,540	1,540	1,540
	---	.04	.34	.59				
	---	.05	.39	.68				
w196285	.9	B	B	B	1.0	1,290	1,345	1,405
	---	B	B	B				
	---	B	B	B				
w196286	1.4	.01	.06	.45	2.0	1,540	1,540	1,540
	---	.01	.06	.46				
	---	.01	.08	.61				

Table 9e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 63 bituminous coal samples from Virginia--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w196287	1.7	33.8	53.3	11.2	5.0	72.8	1.6	4.2	5.2	7,400	13,320
	---	34.4	54.2	11.4	4.9	74.1	1.6	2.7	5.3	7,530	13,560
	---	38.8	61.2	---	5.5	83.6	1.8	3.1	6.0	8,500	15,300
w196288	2.9	33.2	55.7	8.2	5.3	75.9	1.5	8.5	.6	7,550	13,600
	---	34.2	57.4	8.4	5.1	78.2	1.5	6.1	.6	7,780	14,000
	---	37.3	62.7	---	5.6	85.4	1.7	6.7	.7	8,500	15,290
w196289	2.4	34.2	58.5	4.9	5.5	80.0	1.7	7.3	.7	7,970	14,350
	---	35.0	59.9	5.0	5.4	82.0	1.7	5.3	.7	8,170	14,700
	---	36.9	63.1	---	5.6	86.3	1.8	5.6	.8	8,600	15,480
w196290	1.8	25.8	55.8	16.6	4.6	71.6	1.4	5.1	.6	7,070	12,730
	---	26.3	56.8	16.9	4.5	72.9	1.4	3.6	.6	7,200	12,960
	---	31.6	68.4	---	5.4	87.7	1.7	4.3	.7	8,670	15,600
w195439	3.4	36.0	56.0	4.6	5.6	77.8	1.5	10.0	.6	7,940	14,290
	---	37.3	58.0	4.8	5.4	80.5	1.6	7.2	.6	8,220	14,800
	---	39.1	60.9	---	5.7	84.6	1.6	7.6	.7	8,630	15,540
w195440	2.5	18.7	47.9	30.9	3.8	57.7	1.0	5.8	.8	5,590	10,070
	---	19.2	49.1	31.7	3.6	59.2	1.0	3.7	.8	5,740	10,330
	---	28.1	71.9	---	5.3	86.6	1.5	5.4	1.2	8,400	15,120
w195441	3.6	36.8	53.9	5.7	5.7	77.2	1.6	9.0	.8	7,710	13,880
	---	38.2	55.9	5.9	5.5	80.1	1.7	6.0	.8	8,000	14,400
	---	40.6	59.4	---	5.8	85.1	1.8	6.4	.9	8,500	15,300
w195442	3.6	30.8	48.6	17.0	4.8	66.8	1.4	9.1	.8	6,580	11,850
	---	32.0	50.4	17.6	4.6	69.3	1.5	6.1	.8	6,830	12,300
	---	38.8	61.2	---	5.5	84.1	1.8	7.4	1.0	8,290	14,930
w195443	3.4	32.7	49.9	14.0	5.2	69.9	1.4	8.2	1.2	6,950	12,510
	---	33.9	51.7	14.5	5.0	72.4	1.4	5.4	1.2	7,190	12,950
	---	39.6	60.4	---	5.8	84.6	1.7	6.3	1.5	8,410	15,140
w195444	4.3	30.4	60.9	4.4	5.6	79.8	1.7	7.5	1.0	7,920	14,260
	---	31.8	63.6	4.6	5.4	83.4	1.8	3.8	1.0	8,280	14,900
	---	33.3	66.7	---	5.6	87.4	1.9	4.0	1.1	8,680	15,620
w195445	2.3	29.9	50.6	17.2	4.8	69.2	1.3	6.5	1.0	6,870	12,360
	---	30.6	51.8	17.6	4.7	70.8	1.3	4.6	1.0	7,030	12,650
	---	37.1	62.9	---	5.6	86.0	1.6	5.5	1.2	8,530	15,350
w195446	2.6	21.5	36.9	39.0	3.6	49.2	.8	6.9	.4	4,640	8,360
	---	22.1	37.9	40.0	3.4	50.5	.8	4.7	.4	4,770	8,580
	---	36.8	63.2	---	5.7	84.2	1.4	7.9	.7	7,950	14,310

Table 9e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 63 bituminous coal samples from Virginia--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w196287	0.6	0.05	4.20	0.97	9.0	1,145	1,205	1,270
	---	.05	4.27	.99				
	---	.06	4.82	1.11				
w196288	1.3	.05	.12	.45	9.0	1,490	1,540	1,540
	---	.05	.12	.46				
	---	.06	.13	.51				
w196289	1.1	.00	.05	.60	9.0	1,395	1,455	1,515
	---	.00	.05	.61				
	---	.00	.05	.65				
w196290	.8	.01	.19	.45	9.0	1,380	1,435	1,515
	---	.01	.19	.46				
	---	.01	.23	.55				
w195439	1.2	.00	.04	.54	6.0	1,395	1,455	1,515
	---	.00	.04	.56				
	---	.00	.04	.59				
w195440	1.5	.01	.36	.43	8.0	1,540	1,540	1,540
	---	.01	.37	.44				
	---	.02	.54	.65				
w195441	2.1	.00	.07	.74	9.0	1,540	1,540	1,540
	---	.00	.07	.77				
	---	.00	.08	.82				
w195442	1.7	.01	.23	.61	5.0	1,540	1,540	1,540
	---	.01	.24	.63				
	---	.01	.29	.77				
w195443	1.8	.01	.33	.81	9.0	1,540	1,540	1,540
	---	.01	.34	.84				
	---	.01	.40	.98				
w195444	3.4	.01	.30	.71	9.0	1,180	1,235	1,290
	---	.01	.31	.74				
	---	.01	.33	.78				
w195445	1.5	.01	.35	.63	.0	1,515	1,540	1,540
	---	.01	.36	.64				
	---	.01	.43	.78				
w195446	1.8	.01	.08	.30	1.0	1,330	1,380	1,435
	---	.01	.08	.31				
	---	.02	.14	.51				

Table 9e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 63 bituminous coal samples from Virginia--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w195447	2.3	32.3	55.3	10.1	5.0	75.7	1.4	7.1	0.7	7,440	13,380
	---	33.1	56.6	10.3	4.9	77.5	1.4	5.2	.7	7,610	13,700
	---	36.9	63.1	---	5.4	86.4	1.6	5.8	.8	8,490	15,280
w194411	3.8	33.7	60.2	2.3	5.3	80.6	1.6	9.4	.9	8,010	14,420
	---	35.0	62.6	2.4	5.1	83.8	1.7	6.3	.9	8,330	14,990
	---	35.9	64.1	---	5.2	85.8	1.7	6.4	1.0	8,530	15,350
w194412	5.5	31.0	58.0	5.5	5.5	77.2	1.6	9.7	.6	7,670	13,810
	---	32.8	61.4	5.8	5.2	81.7	1.7	5.1	.6	8,120	14,620
	---	34.8	65.2	---	5.5	86.7	1.8	5.4	.7	8,620	15,520
w197299	3.1	34.7	55.8	6.4	5.4	76.8	1.4	7.6	2.4	7,740	13,920
	---	35.8	57.6	6.6	5.2	79.3	1.4	5.0	2.5	7,980	14,370
	---	38.3	61.7	---	5.6	84.9	1.5	5.4	2.7	8,550	15,390
w197300	2.3	30.4	61.1	6.2	4.9	79.3	1.5	7.2	.8	7,870	14,160
	---	31.1	62.5	6.3	4.8	81.2	1.5	5.3	.8	8,050	14,490
	---	33.2	66.8	---	5.1	86.7	1.6	5.6	.9	8,600	15,480
w197301	2.2	33.0	55.2	9.6	4.9	75.7	1.4	7.6	.8	7,490	13,480
	---	33.7	56.4	9.8	4.8	77.4	1.4	5.8	.8	7,660	13,780
	---	37.4	62.6	---	5.3	85.8	1.6	6.4	.9	8,490	15,280
w197302	2.2	33.6	55.9	8.3	5.2	76.8	1.4	7.6	.7	7,520	13,540
	---	34.4	57.2	8.5	5.1	78.5	1.4	5.8	.7	7,690	13,850
	---	37.5	62.5	---	5.5	85.8	1.6	6.3	.8	8,410	15,130
w197303	1.6	31.5	60.8	6.1	5.1	81.5	1.4	5.4	.5	7,970	14,350
	---	32.0	61.8	6.2	5.0	82.8	1.4	4.0	.5	8,100	14,580
	---	34.1	65.9	---	5.3	88.3	1.5	4.3	.5	8,630	15,540
w197304	1.8	32.9	60.9	4.4	5.3	81.7	1.4	6.6	.6	8,090	14,560
	---	33.5	62.0	4.5	5.2	83.2	1.4	5.1	.6	8,240	14,830
	---	35.1	64.9	---	5.4	87.1	1.5	5.3	.6	8,620	15,520
w197305	1.2	33.6	62.3	2.9	5.3	83.7	1.4	6.2	.6	8,350	15,030
	---	34.0	63.1	2.9	5.2	84.7	1.4	5.2	.6	8,450	15,210
	---	35.0	65.0	---	5.4	87.3	1.5	5.4	.6	8,700	15,670
w197306	1.3	32.0	60.7	6.0	5.2	81.7	1.3	5.2	.5	8,000	14,400
	---	32.4	61.5	6.1	5.1	82.8	1.3	4.1	.5	8,100	14,590
	---	34.5	65.5	---	5.5	88.1	1.4	4.4	.5	8,630	15,530
w197308	2.6	24.9	63.1	9.4	4.7	78.4	1.5	5.2	.7	7,550	13,590
	---	25.6	64.8	9.7	4.5	80.5	1.5	3.0	.7	7,750	13,950
	---	28.3	71.7	---	5.0	89.1	1.7	3.3	.8	8,580	15,440

Table 9e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 63 bituminous coal samples from Virginia--continued

Sample number	Air-dried loss	Forms of sulfur Sulfate	Pyritic	Organic	Free swelling	Ash fusion temperature C Initial deform.	soften.	fluid
w195447	1.3	0.00	0.04	0.66	8.0	1,285	1,345	1,395
	---	.00	.04	.68				
	---	.00	.05	.75				
w194411	2.1	.01	.16	.70	9.0	1,130	1,180	1,240
	---	.01	.17	.73				
	---	.01	.17	.75				
w194412	4.4	.01	.08	.54	9.0	1,410	1,460	1,515
	---	.01	.08	.57				
	---	.01	.09	.61				
w197299	1.5	.11	.98	1.31	9.0	1,140	1,240	1,350
	---	.11	1.01	1.35				
	---	.12	1.08	1.45				
w197300	.9	.01	.20	.60	9.0	1,600	1,600G	1,600G
	---	.01	.20	.61				
	---	.01	.22	.66				
w197301	.5	.02	.19	.55	7.0	1,445	1,470	1,555
	---	.02	.19	.56				
	---	.02	.22	.62				
w197302	.8	.01	.10	.60	7.0	1,355	1,410	1,600
	---	.01	.10	.61				
	---	.01	.11	.67				
w197303	.4	.02	.04	.46	9.0	1,230	1,260	1,290
	---	.02	.04	.47				
	---	.02	.04	.50				
w197304	.6	.02	.08	.48	9.0	1,170	1,200	1,290
	---	.02	.08	.49				
	---	.02	.09	.51				
w197305	.2	.02	.10	.46	9.0	1,140	1,195	1,250
	---	.02	.10	.47				
	---	.02	.10	.48				
w197306	.3	.00	.03	.50	9.0	1,195	1,220	1,275
	---	.00	.03	.51				
	---	.00	.03	.54				
w197308	1.6	.01	.07	.64	9.0	1,260	1,290	1,390
	---	.01	.07	.66				
	---	.01	.08	.73				

Table 9e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 63 bituminous coal samples from Virginia--continued

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w195133	0.9	28.4	58.1	12.6	4.8	75.9	1.2	5.1	0.5	7,420	13,360
	---	28.7	58.6	12.7	4.7	76.6	1.2	4.3	.5	7,490	13,480
	---	32.8	67.2	---	5.4	87.7	1.4	5.0	.6	8,580	15,440
w195134	1.1	28.6	59.9	10.4	4.9	77.2	1.3	5.6	.6	7,590	13,670
	---	28.9	60.6	10.5	4.8	78.1	1.3	4.7	.6	7,680	13,820
	---	32.3	67.7	---	5.4	87.2	1.5	5.2	.7	8,580	15,450
w195135	.9	27.8	63.9	7.4	4.9	79.4	1.4	4.2	2.7	7,840	14,120
	---	28.1	64.5	7.5	4.8	80.1	1.4	3.4	2.7	7,910	14,240
	---	30.3	69.7	---	5.2	86.6	1.5	3.7	2.9	8,550	15,390
w195137	.9	26.2	57.6	15.3	4.6	73.8	1.0	4.4	.8	7,220	13,000
	---	26.4	58.1	15.4	4.5	74.5	1.0	3.6	.8	7,290	13,120
	---	31.3	68.7	---	5.4	88.1	1.2	4.3	1.0	8,620	15,510

Table 9e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 63 bituminous coal samples from Virginia--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w195133	0.2	0.00	0.04	0.45	8.0	1,265	1,320	1,370
	---	.00	.04	.45				
	---	.00	.05	.52				
w195134	.1	.01	.08	.52	9.0	1,375	1,435	1,490
	---	.01	.08	.53				
	---	.01	.09	.59				
w195135	.2	.01	1.95	.70	9.0	1,125	1,185	1,235
	---	.01	1.97	.71				
	---	.01	2.13	.76				
w195137	.2	.01	.36	.47	9.0	1,235	1,295	1,350
	---	.01	.36	.47				
	---	.01	.43	.56				

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia.

[Values in percent or parts-per-million. Coal ashed at 525 C. L means less than the value shown; N, not detected; B, not determined; S after element title indicates determinations by automatic plate reading computer assisted, emission spectographic analyses. The standard deviation of any single answer should be taken as plus 50% and minus 35%. Methods of analyses for other elements as shown in figure 1.]

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w193932	2.9	36	24	4.5	1.8	0.23	2.0	16	1.1	0.08	w193932
w193933	5.7	31	17	14	1.3	.76	.78	12	1.2	.12	w193933
w193934	11.8	28	13	20	1.6	.83	.72	9.1	.88	.15	w193934
w193935	16.9	42	28	4.0	.61	.74	1.6	3.6	1.3	.19	w193935
w193936	15.1	50	23	2.9	1.2	.24	2.6	8.3	1.4	.10	w193936
w194292	16.5	56	28	.92	.66	.25	2.2	4.4	1.7	.47	w194292
w194293	7.3	B	B	B	.46	.65	B	B	B	B	w194293
w194294	5.2	52	25	1.1	.58	.65	1.0	9.8	1.5	.08	w194294
w194295	21.0	60	28	.58	.73	.26	2.3	2.9	2.2	.24	w194295
w194296	5.7	42	21	.95	1.3	1.1	3.3	20	.72	.07	w194296
w194297	2.7	43	22	1.7	.71	1.5	2.5	17	1.2	.16	w194297
w194298	7.0	46	24	.60	1.3	.58	4.2	12	.89	.07	w194298
w194299	2.1	B	B	B	.76	1.9	B	B	B	B	w194299
w194300	6.7	52	32	1.1	.46	.70	.76	4.5	1.7	.04	w194300
w194301	11.6	57	26	.70	.56	.35	2.1	8.3	2.5	.03	w194301
w194302	12.3	46	29	.64	1.2	.66	5.0	10	.91	.03	w194302
w194303	23.4	54	25	.57	1.8	.35	4.8	8.4	1.0	.06	w194303
w194304	2.3	39	13	5.6	.98	1.2	1.5	20	.48	.24	w194304
w194305	25.9	47	22	.77	1.7	.21	3.9	14	1.2	.03	w194305
w194852	5.8	31	22	1.7	.55	.70	1.0	29	1.4	.66	w194852
w194853	17.4	53	30	.67	1.0	.54	4.3	4.5	1.2	.06	w194853
w194854	8.4	42	33	2.8	.81	.48	3.2	5.8	1.5	2.2	w194854
w194855	2.5	49	24	2.8	.88	1.6	.38	8.3	2.0	.05	w194855
w193945	7.0	49	24	2.3	1.2	.83	.48	8.1	2.0	.08	w193945
w193946	7.4	46	23	2.8	1.1	.50	1.8	10	1.5	.11	w193946
w193947	6.2	53	30	1.3	.32	.22	1.8	4.4	1.8	.19	w193947
w193948	8.3	29	19	1.0	.45	.38	2.5	37	.78	.08	w193948
w193949	10.5	56	25	.89	1.1	.72	2.8	5.1	1.6	1.7	w193949
w193950	10.1	43	25	2.3	.98	.58	3.6	13	.83	.11	w193950
w193989	7.8	39	24	8.4	2.0	.62	1.5	6.2	1.2	.09	w193989
w193990	6.9	37	24	9.1	2.0	.74	.62	6.6	1.8	.28	w193990
w196283	7.8	53	30	.69	.68	.35	2.7	5.6	1.8	.07	w196283
w196284	6.4	21	18	2.8	.83	.42	1.7	37	.82	.07	w196284
w196285	7.9	50	25	3.8	.99	.85	2.2	6.6	1.4	.06	w196285
w196286	21.8	55	33	.56	.91	.43	4.6	2.6	1.3	.07	w196286
w196287	10.7	26	15	1.2	.66	.38	1.4	41	.86	.06	w196287
w196288	7.7	56	26	1.4	.95	.70	2.5	3.8	1.5	.07	w196288
w196289	5.1	48	27	4.3	.66	.79	1.2	3.9	1.7	3.5	w196289
w196290	17.1	56	24	.52	2.2	.32	5.4	6.6	1.2	.04	w196290
w195439	5.2	46	29	1.8	1.6	.52	3.2	9.2	1.1	.07	w195439

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia--continued

Sample number	SO3 (percent)	Ag-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w193932	6.9	0.40	58	810	53	0.14	380	160	170	10	w193932
w193933	13	.60	76	910	30	.62	260	160	160	8.8	w193933
w193934	16	.20	95	930	8.0	.70	140	53	87	2.5	w193934
w193935	.32	.20	91	910	14	.60	140	22	120	5.3	w193935
w193936	4.1	.20	120	770	9.0	.20	160	35	150	16	w193936
w194292	.60	.30	63	680	16	.34	160	58	140	13	w194292
w194293	B	.40	71	780	25	.22	220	120	200	5.5	w194293
w194294	1.8	.40	96	780	36	.62	170	40	110	3.8	w194294
w194295	.30	.20	75	550	19	.24	140	62	160	10	w194295
w194296	2.3	.10	190	1,900	18	1.1	140	72	110	16	w194296
w194297	2.4	.50	270	950	72	4.7	190	260	130	15	w194297
w194298	1.4	.30	120	670	33	1.3	160	81	130	23	w194298
w194299	B	.70	210	920	85	1.7	140	140	150	9.5	w194299
w194300	.77	.50	74	650	25	.55	240	100	230	6.0	w194300
w194301	.58	.30	73	840	64	.37	160	66	160	12	w194301
w194302	.78	.20	130	660	14	.53	140	32	130	24	w194302
w194303	.62	.10L	110	580	15	.38	120	37	110	18	w194303
w194304	8.8	.70	140	1,000	70	1.5	170	250	120	8.7	w194304
w194305	1.2	.20	110	800	31	.51	58	27	47	6.2	w194305
w194852	2.3	.30	160	630	14	2.0	170	200	150	5.2	w194852
w194853	1.0	.40	110	1,000	9.0	.57	180	35	120	16	w194853
w194854	3.2	.40	170	2,100	11	1.5	260	86	180	11	w194854
w194855	4.2	.70	230	1,300	62	.64	240	260	150	32L	w194855
w193945	4.1	.40	200	1,100	20	.30	210	56	160	2.9	w193945
w193946	4.4	.60	140	1,200	24	.40	190	140	140	5.4	w193946
w193947	1.6	.50	63	510	14	.10	240	52	150	6.5	w193947
w193948	1.9	.70	N	500	37	1.8	200	190	120	12	w193948
w193949	1.3	.30	120	730	13	.26	210	45	140	14	w193949
w193950	3.8	.30	86	630	25	.40	150	41	110	18	w193950
w193989	7.9	.60	73	1,300	18	1.2	190	100	150	9.0	w193989
w193990	7.7	.40	76	1,000	12	.62	280	110	170	5.8	w193990
w196283	.79	.60	150	640	21	1.0	64	28	73	3.8	w196283
w196284	5.1	.40	380	1,500	27	1.6	410	240	330	9.4	w196284
w196285	5.4	2.5	200	2,400	10	3.4	230	140	130	7.6	w196285
w196286	.72	.40	130	890	15	.48	170	58	160	9.2	w196286
w196287	2.1	.60	180	740	10	2.8	110	21	110	7.5	w196287
w196288	2.1	.70	230	1,300	16	.90	230	30	130	16	w196288
w196289	3.1	.60	310	2,700	19	2.8	250	310	180	5.9	w196289
w196290	.73	.20	110	590	32	.58	150	84	110	15	w196290
w195439	3.1	.20	160	860	21	1.1	170	140	170	15	w195439

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	In-S (ppm)	La (ppm)	Sample number
w193932	340	32L	10L	6.9	51	14	160	10	7.0L	170	w193932
w193933	290	32L	14	4.6	34	26	15	11	7.0L	140	w193933
w193934	130	32L	10L	2.5	6.0	11	5.0L	5.9	7.0L	85	w193934
w193935	140	32L	12	2.5	27	7.0L	5.0L	7.7	7.0L	77	w193935
w193936	100	32L	10L	2.5	29	7.0L	5.0L	7.9	7.0L	86	w193936
w194292	130	32L	10	2.5	33	7.0L	8.0	7.3	7.0L	97	w194292
w194293	190	32L	14	3.8	49	7.0L	53	9.6	7.0L	120	w194293
w194294	190	32L	12	2.9	66	12	14	7.7	7.0L	120	w194294
w194295	100	32L	10L	2.3	50	7.0L	55	8.6	7.0L	86	w194295
w194296	250	32L	10L	3.3	53	10	5.0	3.5	7.0L	70	w194296
w194297	620	32L	10L	5.2	93	23	31	7.4	7.0L	74	w194297
w194298	240	32L	10L	3.4	63	9.0	10	4.3	7.0L	86	w194298
w194299	450	32L	19	4.3	80	22	100	14L	7.0L	95	w194299
w194300	200	32L	11	4.0	44	10	52	10	7.0L	130	w194300
w194301	240	32L	10L	3.4	58	11	22	12	7.0L	86	w194301
w194302	160	32L	10L	2.4	55	7.0L	11	4.9	7.0L	73	w194302
w194303	110	32L	10L	2.0	43	7.0L	5.0L	4.7	7.0L	64	w194303
w194304	330	32L	10L	4.8	58	31	91	4.3	7.0L	87	w194304
w194305	120	32L	10L	1.1	45	8.0	10	2.3	7.0L	31	w194305
w194852	140	32L	10L	3.4	51	15	20	6.9	7.0L	86	w194852
w194853	140	32L	12	2.9	49	11	5.0	6.3	7.0L	98	w194853
w194854	310	32L	10L	4.6	53	8.0	24	8.3	7.0L	140	w194854
w194855	420	32L	10L	4.8	61	22	41	12	7.0L	160	w194855
w193945	220	32L	13	4.1	27	17	5.0L	11	7.0L	130	w193945
w193946	250	32L	10	3.9	52	12	18	8.1	7.0L	110	w193946
w193947	130	32L	10L	4.0	40	7.0	7.0	9.7	7.0L	130	w193947
w193948	530	32L	15	6.7	41	18	9.0	4.8	7.0L	96	w193948
w193949	190	32L	10L	3.4	42	7.0L	5.0L	8.6	7.0L	110	w193949
w193950	170	32L	10L	2.6	38	7.0L	5.0L	4.0	7.0L	69	w193950
w193989	220	32L	10L	3.2	50	11	15	7.7	7.0L	120	w193989
w193990	290	32L	10L	4.3	50	7.0L	5.0L	12	7.0L	170	w193990
w196283	270	32L	10L	1.3	77	7.0L	27	5.1	7.0L	38	w196283
w196284	220	32L	10L	8.3	59	7.0L	110	16	7.0L	220	w196284
w196285	350	32L	10L	4.8	53	13	5.0L	8.9	7.0L	130	w196285
w196286	170	32L	10L	3.0	54	8.0	5.0L	6.9	7.0L	92	w196286
w196287	150	32L	10L	2.1	31	7.0L	7.0	4.7	7.0L	56	w196287
w196288	230	32L	10L	4.8	52	7.0L	5.0	10	7.0L	130	w196288
w196289	220	32L	12	4.3	48	17	28	9.8	7.0L	160	w196289
w196290	100	32L	10L	2.7	51	7.0L	43	5.8	7.0L	82	w196290
w195439	270	22L	10L	3.7	25	10	14	3.8	7.0L	96	w195439

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Sample number
w193932	210	3	360	19	10	75	120	78	68L	240L	w193932
w193933	130	2	330	33	20	46L	110	30	68L	160L	w193933
w193934	90	.8	390	16	10	46L	49	10	68L	76L	w193934
w193935	170	1	130	16	24	46L	49	54	68L	59	w193935
w193936	140	1	220	5.0	23	59	48	25	68L	210	w193936
w194292	250	1	59	8.0	16	90	97	75	68L	160	w194292
w194293	220	1	71	8.0	17	110	270	130	68L	300L	w194293
w194294	170	2	67	46	24	140	200	65	68L	370L	w194294
w194295	530	1	46	3.0L	18	72	110	65	68L	100	w194295
w194296	160	2	760	43	6	68	120	52	68L	350L	w194296
w194297	81	4	190	45	10	130	280	61	68L	670L	w194297
w194298	100	1	170	42	6	98	140	67	68L	270	w194298
w194299	74	5	140	110	8	120	270	74	68L	760L	w194299
w194300	250	1	89	8.0	19	96	220	76	68L	280L	w194300
w194301	180	2	92	12	37	46L	87	63	68L	190L	w194301
w194302	79	.8	73	20	6	65	70	48	68L	230	w194302
w194303	89	.9	230	11	5	59	69	40	68L	250	w194303
w194304	53	4	1,300	130	16	100	270	58	68L	610L	w194304
w194305	74	.4	220	13	10	86	100	38	68L	85	w194305
w194852	81	2	150	15	21	46L	180	35	68L	690L	w194852
w194853	110	1	160	5.0	16	110	73	60	68L	330L	w194853
w194854	180	1	140	10	12	90	120	100	68L	540L	w194854
w194855	92	4	530	15	40	110	420	70	68L	1,300L	w194855
w193945	180	1	140	14	38	140	79	42	68L	240L	w193945
w193946	130	1	210	20	16	64	130	58	68L	230L	w193946
w193947	250	2	180	16	18	89	110	75	68L	180L	w193947
w193948	110	4	200	34	11	73	150	70	68L	200L	w193948
w193949	190	2	150	10	17	57	81	75	68L	180	w193949
w193950	140	1	140	15	8	53	48	30	68L	190	w193950
w193989	230	1	420	13	10	46L	91	76	68L	B	w193989
w193990	210	1	270	13	14	46L	74	95	68L	B	w193990
w196283	310	1	73	18	15	62	160	120	68L	270L	w196283
w196284	120	2	370	24	13	46L	78	31	68L	420L	w196284
w196285	130	1	540	11	10	46L	330	93	68L	370L	w196285
w196286	230	.9	140	6.0	21	130	71	84	68L	200	w196286
w196287	81	.9	170	110	27	69	64	24	68L	260L	w196287
w196288	200	1	66	9.0	16	55	68	80	68L	160	w196288
w196289	110	2	59	15	40	79	370	56	68L	650L	w196289
w196290	200	1	250	4.0	13	50	81	44	68L	230	w196290
w195439	130	2	320	6.0	6	62	110	63	68L	210	w195439

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia--continued

Sample number	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Sample number
w193932	45	45	11	850	6.9	100L	10L	24	130	85	w193932
w193933	35	26	10	920	5.3	53L	10L	16	140	110	w193933
w193934	19	14	7.0L	840	1.7	25L	10L	12	71	49	w193934
w193935	27	14	7.0L	620	2.4	41	10L	14	140	67	w193935
w193936	28	14	7.0L	860	1.3	26	10L	6.0	130	38	w193936
w194292	31	13	8.0	780	1.8	18L	10L	14	210	56	w194292
w194293	44	19	7.0L	970	2.7	41L	10L	45	240	89	w194293
w194294	31	17	7.0L	960	1.9	58L	10L	40	250	130	w194294
w194295	34	11	7.0L	610	1.9	24	10L	14	250	52	w194295
w194296	35	14	7.0L	800	1.8	53L	27	30	190	70	w194296
w194297	48	22	13	1,400	3.7	110L	10L	41	180	140	w194297
w194298	43	17	7.0L	610	2.9	43L	10L	36	250	99	w194298
w194299	38	19	7.0L	1,600	14L	140L	23	76	340	180	w194299
w194300	36	22	7.0L	900	3.0	45L	10L	49	230	95	w194300
w194301	34	16	7.0L	380	2.6	34	29	22	170	59	w194301
w194302	31	13	7.0L	570	1.6	24L	10L	29	220	37	w194302
w194303	25	11	7.0L	240	1.7	13L	10L	16	180	38	w194303
w194304	48	17	9.0	1,600	4.3	130L	10L	96	310	200	w194304
w194305	12	5.0	7.0L	650	.77	12L	10L	6.9	150	42	w194305
w194852	43	16	7.0L	850	3.4	52L	21	17	130	65	w194852
w194853	30	16	14	520	2.3	17	10L	9.8	190	60	w194853
w194854	40	24	13	2,900	3.6	36L	12	23	210	53	w194854
w194855	36	24	7.0L	2,300	4.0	120L	15L	36	170	110	w194855
w193945	34	19	9.0	1,600	2.9	43L	10L	17	160	120	w193945
w193946	43	19	11	1,800	2.7	68	10L	16	190	75	w193946
w193947	35	21	13	710	3.2	48L	10L	15	190	46	w193947
w193948	39	28	7.0L	530	6.0	36L	37	16	120	120	w193948
w193949	32	17	13	790	2.9	48	10L	15	140	37	w193949
w193950	26	13	7.0L	590	2.0	30L	17	27	140	37	w193950
w193989	33	17	10	1,100	2.6	38L	10L	19	150	42	w193989
w193990	38	23	10	1,000	4.3	43L	10L	26	110	64	w193990
w196283	24	6.4	7.0L	530	6.4L	38L	15	10	210	39	w196283
w196284	64	36	8.0	1,300	6.3	47L	10L	38	100	48	w196284
w196285	29	22	7.0L	1,400	3.8	38L	10L	15	94	37	w196285
w196286	34	15	7.0L	250	2.3	28	10L	13	200	66	w196286
w196287	18	9.3	7.0L	390	1.9	28L	10L	18	110	47	w196287
w196288	34	22	7.0L	1,100	3.9	39L	10L	21	140	38	w196288
w196289	37	22	7.0L	5,200	9.8L	59L	10L	24	230	110	w196289
w196290	25	13	10	220	1.8	18L	10L	7.0	130	44	w196290
w195439	33	19	2.0L	2,100	3.8	58L	5.0	23	75	37	w195439

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia--continued

Sample number	Yb (ppm)	Zn (ppm)	Zr-S (ppm)
w193932	21	78	75
w193933	14	56	220
w193934	6.8	27	150
w193935	6.5	57	220
w193936	6.0	27	120
w194292	6.1	53	120
w194293	9.6	70	160
w194294	9.6	72	270
w194295	6.7	58	130
w194296	8.8	290	77
w194297	15	130	110
w194298	10	340	93
w194299	14	350	96
w194300	10	71	180
w194301	10	39	510
w194302	6.5	150	50
w194303	4.7	120	71
w194304	13	380	130
w194305	2.7	140	100
w194852	12	110	190
w194853	7.5	110	130
w194854	11	88	91
w194855	12	91	350
w193945	10	31	520
w193946	11	120	110
w193947	9.7	83	94
w193948	24	460	56
w193949	8.6	110	90
w193950	5.9	57	70
w193989	7.7	280	120
w193990	13	47	200
w196283	5.1	130	90
w196284	14	120	99
w196285	10	740	110
w196286	7.3	64	160
w196287	4.7	300	200
w196288	9.1	120	80
w196289	9.8	110	290
w196290	7.0	120	79
w195439	9.6	240	52

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia--continued

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w195440	30.5	63	26	0.56	0.75	0.27	2.8	3.0	2.6	0.19	w195440
w195441	5.9	52	31	1.3	.60	.46	2.4	4.0	1.5	.04	w195441
w195442	14.2	55	30	.65	1.3	.28	4.0	4.3	1.2	.10	w195442
w195443	13.3	58	27	.67	.96	.30	3.4	5.2	1.2	.06	w195443
w195444	5.1	43	25	2.4	1.4	.79	2.4	12	1.1	.11	w195444
w195445	16.4	52	28	1.6	1.1	.25	3.1	7.0	1.4	.04	w195445
w195446	41.6	57	19	5.6	1.0	.23	3.1	3.2	1.7	.02	w195446
w195447	11.2	36	18	17	1.1	.24	.97	5.9	1.3	.28	w195447
w194411	2.1	B	B	B	1.3	1.3	B	B	B	B	w194411
w194412	3.4	46	29	1.9	.98	1.6	1.6	8.9	1.7	.06	w194412
w197299	5.4	42	22	1.5	.68	.25	1.8	27	1.1	.21	w197299
w197300	4.7	54	30	1.3	.45	.57	.88	6.3	1.8	.37	w197300
w197301	10.6	50	26	2.1	1.6	.25	3.1	8.9	1.3	.08	w197301
w197302	9.3	48	28	3.0	1.5	.29	2.9	7.9	1.3	.16	w197302
w197303	8.4	39	24	9.0	1.6	.96	3.6	9.0	1.0	.04	w197303
w197304	4.3	33	21	9.5	2.0	1.3	2.3	15	.85	.06	w197304
w197305	4.1	34	21	17	1.8	.66	2.5	19	.94	.07	w197305
w197306	6.3	41	22	7.9	1.5	.64	2.6	10	1.2	.05	w197306
w197308	8.6	43	23	8.9	1.7	.31	1.6	8.2	1.2	.07	w197308
w195111	11.0	40	24	1.1	1.3	.37	4.1	18	.94	.05	w195111
w195112	33.7	49	29	.54	1.5	.60	5.1	6.3	1.1	.03	w195112
w195113	13.4	57	26	.93	.98	.40	1.3	5.4	1.7	.25	w195113
w195114	8.9	49	29	1.3	1.5	.61	3.2	6.3	1.1	.07	w195114
w195115	37.1	52	30	.44	1.4	.51	5.1	4.0	1.1	.06	w195115
w195116	9.0	41	18	.96	1.1	.30	3.6	24	.72	.10	w195116
w195117	22.0	65	19	.74	.71	.25	2.7	4.2	1.6	.13	w195117
w195118	2.7	23	20	4.7	1.5	.50	1.6	25	.96	.16	w195118
w195119	8.5	50	23	1.2	1.2	.48	4.2	9.5	1.2	.12	w195119
w195120	5.0	45	22	2.4	1.5	.54	3.1	12	1.2	.08	w195120
w195121	44.9	56	24	.57	1.7	.39	4.9	4.9	.97	.03	w195121
w195122	6.5	41	24	3.6	2.0	.41	4.0	8.6	.87	.04	w195122
w195123	7.5	29	15	3.0	1.5	.36	2.4	29	.77	.05	w195123
w195124	10.3	48	27	1.0	1.5	.26	4.3	8.1	1.2	.07	w195124
w195125	8.5	53	27	.86	1.2	.48	2.2	6.3	1.4	.05	w195125
w195126	32.6	54	24	.62	2.0	.37	5.0	6.0	.98	.06	w195126
w195127	15.2	51	24	.80	1.5	.62	5.0	8.0	.88	.05	w195127
w195128	13.1	55	18	1.3	1.5	.51	3.6	11	.92	.05	w195128
w195129	13.4	59	23	1.2	.96	.40	2.9	4.6	1.0	.11	w195129
w195130	34.8	55	26	.62	1.5	.31	4.9	5.3	.95	.03	w195130
w195133	15.6	50	24	6.5	.96	.26	.64	3.9	2.3	.93	w195133

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia--continued

Sample number	SO3 (percent)	Ag-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w195440	0.49	0.10L	43	460	9.0	0.15	200	33	170	12	w195440
w195441	2.1	.30	84	610	37	.40	240	240	170	8.5	w195441
w195442	.76	.10	71	580	9.0	.67	160	38	160	11	w195442
w195443	.97	.20	87	630	12	.54	98	14	59	6.8	w195443
w195444	4.0	.20	56	680	16	.76	220	120	170	7.8	w195444
w195445	2.5	.10L	50	470	12	.45	200	85	130	12	w195445
w195446	1.3	.10L	42	410	5.0	.31	170	8.4	140	8.2	w195446
w195447	5.0	.10L	37	430	4.0	.28	140	30	100	3.6	w195447
w194411	B	.50	630	1,000	24	1.7	330	120	180	14	w194411
w194412	3.9	.70	260	1,400	32	1.1	240	190	130	8.8	w194412
w197299	2.7	.20	120	410	15	.23	170	22	150	5.6	w197299
w197300	1.7	.30	110	510	53	1.2	280	160	160	2.1	w197300
w197301	3.7	.20	120	510	19	.56	220	110	160	11	w197301
w197302	5.1	.10	170	580	13	.95	260	100	230	11	w197302
w197303	8.3	.10L	98	1,500	16	.34	150	92	120	13	w197303
w197304	13	.40	57	1,700	110	.34	190	120	140	9.3	w197304
w197305	11	.40	52	1,200	160	.26	150	120	130	9.8	w197305
w197306	9.9	.10	93	710	40	.33	170	120	98	7.9	w197306
w197308	5.8	.10L	47	820	16	.28	170	110	130	10	w197308
w195111	2.3	.30	44	1,800	12	1.0	150	66	120	14	w195111
w195112	1.0	.10	86	770	7.0	.28	130	33	110	15	w195112
w195113	1.0	.30	40	560	11	.42	200	29	130	4.5	w195113
w195114	1.8	.20	73	3,100	14	.60	210	90	160	18	w195114
w195115	.70	.20	85	840	8.0	.18	120	25	110	16	w195115
w195116	1.9	.30	26	500	17	.86	120	44	80	16	w195116
w195117	.70	.20	78	540	14	.34	150	38	95	10	w195117
w195118	7.0	.80	30	2,100	9.0	1.7	190	44	110	15	w195118
w195119	1.7	.10	55	690	13	.90	200	48	120	19	w195119
w195120	3.7	.20	50	990	12	1.9	160	40	94	14	w195120
w195121	1.3	.10L	77	720	8.0	.72	120	21	99	16	w195121
w195122	6.4	.30	120	1,300	19	.42	170	120	110	11	w195122
w195123	5.6	.10	83	950	15	.60	110	43	81	12	w195123
w195124	1.5	.10L	42	630	10	.64	200	45	130	23	w195124
w195125	1.2	.20	41	960	15	.48	220	94	140	14	w195125
w195126	1.3	.10L	61	680	6.0	.24	100	25	98	8.9	w195126
w195127	1.5	.10L	48	720	8.0	.79	120	41	100	22	w195127
w195128	2.1	.10L	34	550	7.0	.55	99	44	91	11	w195128
w195129	1.8	.30	35	600	14	.25	280	26	87	19	w195129
w195130	1.2	.10	55	600	6.0	.73	120	26	100	16	w195130
w195133	3.4	.10L	30	510	9.0	.10L	220	14	150	3.2	w195133

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	In-S (ppm)	La (ppm)	Sample number
w195440	100	22L	10L	2.3	28	7.0L	2.0	13	7.0L	120	w195440
w195441	270	22L	10L	5.9	31	12	22	6.8	7.0L	120	w195441
w195442	140	22L	10L	2.7	25	9.0	2.0L	5.6	7.0L	99	w195442
w195443	140	22L	10L	1.3	27	11	2.0	3.0	7.0L	60	w195443
w195444	260	22L	10L	5.3	31	12	11	5.9	7.0L	120	w195444
w195445	160	22L	10L	3.6	24	8.0	2.0	9.8	7.0L	110	w195445
w195446	81	22L	10L	2.2	22	8.0	2.0L	7.9	7.0L	99	w195446
w195447	130	22L	10L	2.1	21	11	2.0L	6.3	7.0L	80	w195447
w194411	450	22L	10L	8.1	57	16	7.0	14L	7.0L	140	w194411
w194412	350	23	12	4.4	67	16	19	12	7.0L	150	w194412
w197299	110	22L	10L	3.0	41	13	46	7.4	7.0L	93	w197299
w197300	310	22L	12	5.5	56	21	32	13	7.0L	150	w197300
w197301	210	22L	10L	4.9	33	14	10	6.6	7.0L	100	w197301
w197302	260	22L	12	5.6	34	11	2.0L	6.5	7.0L	120	w197302
w197303	250	22L	10L	2.6	26	11	16	6.0	7.0L	83	w197303
w197304	210	22L	10L	4.0	77	12	65	9.3	7.0L	93	w197304
w197305	200	22L	10L	4.1	100	13	160	7.3	7.0L	73	w197305
w197306	260	22L	10L	3.2	29	11	4.0	9.5	7.0L	95	w197306
w197308	160	22L	10L	3.1	38	15	4.0	7.0	7.0L	93	w197308
w195111	180	22L	10L	2.6	33	15	2.0L	4.5	7.0L	73	w195111
w195112	90	22L	10L	2.0	31	12	2.0L	4.7	7.0L	71	w195112
w195113	210	22L	10L	3.4	28	12	2.0L	9.0	7.0L	130	w195113
w195114	150	22L	10L	5.1	28	15	2.0L	5.6	7.0L	100	w195114
w195115	79	22L	10L	1.9	30	11	2.0L	4.9	7.0L	67	w195115
w195116	170	22L	10L	2.1	27	14	27	4.4	7.0L	56	w195116
w195117	150	22L	10L	2.4	26	13	8.0	9.1	7.0L	86	w195117
w195118	400	22L	10L	3.7	28	7.0L	25	3.7	8.0	110	w195118
w195119	330	22L	10L	3.4	34	14	2.0	7.1	7.0L	110	w195119
w195120	280	22L	10L	3.0	23	16	6.0	6.0	7.0L	80	w195120
w195121	95	22L	10L	2.0	29	12	2.0L	4.2	7.0L	69	w195121
w195122	170	22L	10L	3.7	28	15	3.0	3.1	7.0L	62	w195122
w195123	190	22L	10L	2.3	23	21	2.0L	4.0	7.0L	53	w195123
w195124	220	22L	10L	3.4	27	11	5.0	4.9	7.0L	87	w195124
w195125	150	22L	10L	3.6	26	10	2.0L	8.2	7.0L	120	w195125
w195126	64	22L	10L	1.7	24	10	2.0L	4.0	7.0L	58	w195126
w195127	130	22L	10L	2.0	26	11	2.0L	4.6	7.0L	66	w195127
w195128	85	22L	10L	1.8	14	9.0	2.0L	6.9	7.0L	61	w195128
w195129	260	22	10L	6.3	18	19	2.0L	7.5	7.0L	130	w195129
w195130	79	22L	10L	1.9	27	9.0	2.0L	4.0	7.0L	66	w195130
w195133	240	22L	10L	2.7	23	13	2.0L	11	7.0L	130	w195133

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Sample number
w195440	260	1	56	2.0L	31	48	42	55	68L	250	w195440
w195441	170	2	56	2.0L	10	77	130	100	68L	460L	w195441
w195442	160	1	98	5.0	7	56	65	67	68L	350	w195442
w195443	75	.8	75	6.0	10	73	65	59	68L	140	w195443
w195444	140	2	320	13	5	66	97	51	68L	450L	w195444
w195445	150	1	1,300	7.0	5	61	76	59	68L	180	w195445
w195446	130	1	290	2.0L	8	46L	16	48	68L	180	w195446
w195447	110	.9	750	5.0	7	46L	35	40	68L	200L	w195447
w194411	90	5	890	39	8	48	120	78	68L	620L	w194411
w194412	130	3	270	31	28	81	220	100	68L	440L	w194412
w197299	210	2	200	28	21	72	69	51	68L	330L	w197299
w197300	260	2	52	26	33	110	270	94	68L	320L	w197300
w197301	320	2	200	11	15	95	110	66	68L	180	w197301
w197302	280	2	250	11	12	86	100	82	68L	260L	w197302
w197303	150	1	530	6.0	12	46L	65	68	68L	190	w197303
w197304	170	2	860	8.0	7	46L	110	81	68L	440L	w197304
w197305	220	2	1,800	9.0	14	46L	130	140	68L	460L	w197305
w197306	170	2	460	5.0	10	46L	72	64	68L	320L	w197306
w197308	110	1	280	15	20	50	100	47	68L	230L	w197308
w195111	160	.9	120	26	9	75	100	50	68L	210	w195111
w195112	140	.9	130	2.0L	10	60	57	39	68L	280	w195112
w195113	170	1	130	7.0	28	77	84	72	68L	250L	w195113
w195114	150	2	150	9.0	12	110	120	50	68L	390L	w195114
w195115	140	.8	110	2.0	18	64	62	37	68L	350	w195115
w195116	120	1	160	23	6	67	58	52	68L	180	w195116
w195117	120	.9	160	5.0	28	87	51	37	68L	170	w195117
w195118	150	4L	180	34	10	59	50	44	110	670L	w195118
w195119	140	1	160	16	13	100	84	50	68L	270	w195119
w195120	160	2	280	18	17	95	73	52	68L	260	w195120
w195121	120	.7	150	4.0	14	87	57	41	68L	300	w195121
w195122	96	2	170	15	8	94	110	59	68L	320L	w195122
w195123	65	1	200	36	14	72	74	31	68L	330L	w195123
w195124	170	2	210	7.0	7	72	51	56	68L	260L	w195124
w195125	180	1	150	6.0	9	63	94	50	68L	320L	w195125
w195126	100	.6	280	2.0L	9	60	47	37	68L	260	w195126
w195127	130	.7	220	8.0	3	46L	58	41	68L	290	w195127
w195128	97	.8	400	6.0	5	46L	55	28	68L	220	w195128
w195129	160	2	200	3.0	7	110	54	110	68L	250	w195129
w195130	110	.9	210	2.0	4	56	53	37	68L	380	w195130
w195133	270	1	440	4.0	27	46L	48	72	68L	150L	w195133

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia--continued

Sample number	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Sample number
w195440	34	14	6.0	310	2.0	39	3.0L	12	100	27	w195440
w195441	46	29	3.0	670	5.1	51L	3.0L	24	110	83	w195441
w195442	30	15	3.0	280	2.1	21L	3.0L	15	140	41	w195442
w195443	15	9.0	5.0	460	1.5	23L	3.0L	25	120	45	w195443
w195444	43	25	2.0L	1,200	3.9	59L	4.0	24	120	58	w195444
w195445	29	20	5.0	370	2.4	24	3.0L	15	120	29	w195445
w195446	27	13	4.0	430	1.7	29	3.0L	10	81	19	w195446
w195447	24	12	6.0	960	1.8	27L	3.0L	13	66	26	w195447
w194411	71	38	2.0	1,200	14L	140L	3.0L	48	200	110	w194411
w194412	50	24	4.0	1,600	2.9	88L	3.0L	41	150	94	w194412
w197299	37	13	2.0L	690	1.9	56L	36	26	170	52	w197299
w197300	55	26	5.0	1,300	4.3	64L	3.0L	34	240	120	w197300
w197301	42	24	2.0	970	4.7	28L	3.0L	15	160	92	w197301
w197302	59	27	3.0	1,000	4.3	32L	3.0L	19	210	60	w197302
w197303	40	13	2.0L	1,500	2.4	36L	3.0L	18	100	64	w197303
w197304	33	19	2.0L	3,300	4.7	70L	3.0L	23	120	71	w197304
w197305	34	17	2.0L	2,800	4.9	73L	3.0L	24	140	95	w197305
w197306	24	16	2.0L	2,000	3.2	48L	3.0L	21	90	63	w197306
w197308	31	16	2.0	1,600	2.3	35L	4.0	22	130	72	w197308
w195111	25	15	2.0L	1,000	1.8	45	3.0L	25	130	43	w195111
w195112	26	11	2.0	550	1.5	8.9L	3.0L	13	150	33	w195112
w195113	32	16	9.0	1,300	1.5	22L	3.0L	20	160	50	w195113
w195114	34	22	2.0L	1,600	3.4	34L	3.0L	19	230	78	w195114
w195115	26	10	6.0	480	1.3	16	3.0L	11	140	40	w195115
w195116	20	11	2.0L	530	2.2	33L	44	24	100	35	w195116
w195117	23	13	8.0	610	1.8	14L	3.0L	12	150	56	w195117
w195118	22	19	2.0L	6,000	3.7	110L	3.0L	26	88	64	w195118
w195119	29	19	2.0L	1,200	2.4	35L	3.0L	21	160	70	w195119
w195120	22	14	2.0L	2,900	2.0	60L	3.0L	22	130	64	w195120
w195121	21	11	7.0	360	1.3	6.7	3.0L	13	160	44	w195121
w195122	29	17	2.0	3,200L	3.1	46L	5.0	20	130	69	w195122
w195123	19	11	2.0L	2,900	1.3	40L	3.0L	20	120	57	w195123
w195124	28	18	2.0	640	1.9	29L	5.0	30	140	47	w195124
w195125	27	19	2.0	1,300	2.4	35L	3.0L	16	120	37	w195125
w195126	22	9.5	2.0L	540	1.2	9.2L	3.0L	8.9	130	35	w195126
w195127	24	12	2.0L	800	1.3	20L	3.0L	15	120	29	w195127
w195128	18	9.9	2.0L	830	1.5	23L	3.0L	9.2	69	20	w195128
w195129	34	34	4.0	660	5.2	30	3.0L	29	110	91	w195129
w195130	22	11	6.0	460	1.1	29	3.0L	13	110	27	w195130
w195133	35	15	7.0	1,600	1.9	26	3.0L	17	130	49	w195133

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia--continued

Sample number	Yb (ppm)	Zn (ppm)	Zr-S (ppm)
w195440	7.5	51	200
w195441	15	70	92
w195442	5.6	220	100
w195443	4.5	90	110
w195444	14	130	79
w195445	8.5	83	66
w195446	5.3	33	76
w195447	5.4	29	120
w194411	24	270	67
w194412	15	110	270
w197299	7.4	85	150
w197300	15	250	240
w197301	13	280	120
w197302	13	150	65
w197303	8.3	41	120
w197304	14	73	89
w197305	12	120	150
w197306	9.5	36	150
w197308	7.0	59	230
w195111	6.4	110	79
w195112	5.0	120	72
w195113	6.7	33	170
w195114	11	120	90
w195115	4.9	96	170
w195116	4.4	190	72
w195117	5.9	56	240
w195118	7.4	350	110
w195119	8.2	180	110
w195120	6.0	270	180
w195121	4.2	230	130
w195122	9.2	110	71
w195123	5.3	140	120
w195124	7.8	260	72
w195125	9.4	70	79
w195126	4.0	140	80
w195127	4.6	110	52
w195128	4.6	160	71
w195129	12	100	110
w195130	4.3	150	57
w195133	6.4	17	200

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia--continued

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w195134	14.0	51	23	0.99	1.7	0.19	5.2	6.4	1.1	0.02	w195134
w195135	8.7	14	6.2	18	2.2	.15	.81	28	.37	.04	w195135
w195137	21.8	56	21	3.7	1.2	.25	2.3	5.3	1.4	.11	w195137

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia--continued

Sample number	SO3 (percent)	Ag-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w195134	1.8	0.20	62	780	13	0.73	120	41	99	21	w195134
w195135	14	.10L	10L	760	14	.89	57	43	45	4.6	w195135
w195137	3.1	.10L	35	530	9.0	.61	190	21	130	7.8	w195137

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	In-S (ppm)	La (ppm)	Sample number
w195134	120	22L	10L	2.0	29	10	3.0	5.0	7.0L	50	w195134
w195135	140	22L	10L	1.3	11	15	2.0L	2.3	7.0L	23	w195135
w195137	250	22L	10L	3.4	17	12	2.0L	8.3	7.0L	100	w195137

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia--continued.

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Sample number
w195134	110	0.7	200	2.0L	3	52	43	41	68L	210	w195134
w195135	43	1	430	21	2L	46L	76	10L	68L	220L	w195135
w195137	140	1	330	5.0	8	71	43	56	68L	180	w195137

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia--continued

Sample number	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Sample number
w195134	23	11	2.0L	550	1.4	21L	3.0L	9.3	110	30	w195134
w195135	9.2	5.7	2.0L	1,400	1.1	34L	3.0L	14	49	28	w195135
w195137	27	17	4.0	610	2.8	23	3.0L	11	120	32	w195137

Table 9f.--Major and minor oxide and trace element compostion of the laboratory ash of 83 bituminous coal samples from Virginia--continued

Sample number	Yb (ppm)	Zn (ppm)	Zr-S (ppm)
w195134	5.7	62	63
w195135	3.4	110	53
w195137	7.8	67	84

Table 9g.--Content of 22 trace elements in 83 bituminous coal samples from Virginia.

[Analysis performed on whole-coal. Values in parts-per-million (ppm). L, less than the value shown; B, not determined.]

Sample number	As (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	La (ppm)	Sample number
w193932	2.0	11	4.5	4.9	0.3	0.20	24	0.3	0.010	5	w193932
w193933	6.0	15	8.9	9.0	.5	.26	23	.6	.060	8	w193933
w193934	15	17	6.2	10	.3	.30	29	.7	.11	10	w193934
w193935	13	24	3.8	21	.9	.43	58	1.3	.080	13	w193935
w193936	16	24	5.3	22	2.4	.38	110	1.2	.80	13	w193936
w194292	15	27	9.5	23	2.1	.41	130	1.2	.11	16	w194292
w194293	1.0	16	9.0	15	.4	.28	39	.7	.040	9	w194293
w194294	14	9.0	2.1	5.9	.2	.15	30	.4	.020	6	w194294
w194295	2.0	30	13	33	2.1	.49	130	1.8	.010L	18	w194295
w194296	14	8.0	4.1	6.4	.9	.19	44	.2	.10	4	w194296
w194297	16	5.0	6.9	3.5	.4	.14	20	.2	.060	2	w194297
w194298	12	11	5.7	8.8	1.6	.24	66	.3	.070	6	w194298
w194299	8.0	3.0	3.0	3.2	.2	.09	20L	.3L	.040	2	w194299
w194300	1.0	16	6.9	16	.4	.27	34	.7	.030	9	w194300
w194301	55	18	7.6	18	1.4	.39	64	1.4	.16	10	w194301
w194302	38	17	3.9	16	2.9	.30	120	.6	.070	9	w194302
w194303	170	27	8.6	25	4.1	.47	200	1.1	.13	15	w194303
w194304	7.0	4.0	5.7	2.8	.2	.11	30	.1	.040	2	w194304
w194305	35	15	6.9	12	1.6	.28	94	.6	.17	8	w194305
w194852	15	10	12	8.8	.3	.20	60	.4	.24	5	w194852
w194853	4.0	31	6.1	21	2.7	.51	92	1.1	.12	17	w194853
w194854	4.0	22	7.2	15	.9	.39	76	.7	.28	12	w194854
w194855	1.0	6.0	6.6	3.7	.8L	.12	20L	.3	.10	4	w194855
w193945	4.0	15	3.9	11	.2	.29	29	.8	.040	9	w193945
w193946	5.0	14	10	11	.4	.29	39	.6	.020	8	w193946
w193947	8.0	15	3.2	9.5	.4	.25	39	.6	.13	8	w193947
w193948	110	17	16	9.8	1.0	.56	44	.4	.25	8	w193948
w193949	2.0	22	4.7	14	1.5	.36	74	.9	.020	12	w193949
w193950	120	15	4.1	11	1.8	.26	85	.4	.37	7	w193950
w193989	4.0	15	8.0	12	.7	.25	33	.6	.010L	9	w193989
w193990	5.0	19	7.4	12	.4	.30	30	.8	.020	12	w193990
w196283	78	5.0	2.2	5.7	.3	.10	68	.4	.20	3	w196283
w196284	8.0	26	15	21	.6	.53	160	1.0	.26	14	w196284
w196285	1.0	18	11	10	.6	.38	72	.7	.090	10	w196285
w196286	1.0	36	13	35	2.0	.65	300	1.5	.030	20	w196286
w196287	16	12	2.2	12	.8	.23	68	.5	.24	6	w196287
w196288	2.0	18	2.3	9.7	1.2	.37	220	.8	.060	10	w196288
w196289	2.0	13	16	9.3	.3	.22	200	.5	.10	8	w196289
w196290	7.0	26	14	19	2.6	.46	220	1.0	.070	14	w196290
w195439	2.0	9.0	7.3	8.7	.8	.19	76	.2	.16	5	w195439

Table 9g.--Content of 22 trace elements in 83 bituminous coal samples from Virginia--continued

Sample number	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Th (ppm)	Sample number
w193932	0.1	49	10	7L	1.5	1.3	1.1	1.3	0.2	3.0L	w193932
w193933	.1	320	30	9L	1.1	2.0	1.2	1.5	.3	3.0L	w193933
w193934	.1	730	77	9L	1.1	2.2	3.9	1.7	.2	3.0L	w193934
w193935	.2	930	140	10	1.1	4.6	4.5	2.4	.4	7.0	w193935
w193936	.2	270	66	32	.50	4.2	3.7	2.1	.2	4.0	w193936
w194292	.2	310	340	27	.60	5.1	2.2	2.2	.3	3.0L	w194292
w194293	.1	350	B	22L	1.0	3.2	1.4	1.4	.2	3.0L	w194293
w194294	.1	250	18	19L	.90	1.6	.8	.90	.1	3.0L	w194294
w194295	.2	400	220	21	1.3	7.1	2.7	2.4	.4	5.0	w194295
w194296	.1	450	17	20L	1.0	2.0	1.8	.80	.1	3.0L	w194296
w194297	.1	300	19	18L	1.0	1.3	2.8	.60	.1	3.0L	w194297
w194298	.1	300	21	19	1.7	3.0	1.1	1.2	.2	3.0L	w194298
w194299	.1	300	B	16L	1.5	.80	1.3	.40	.3L	3.0L	w194299
w194300	.1	350	12	19L	1.1	2.4	1.4	1.5	.2	3.0L	w194300
w194301	.2	300	15	22L	1.2	4.0	3.0	1.9	.3	4.0	w194301
w194302	.1	600	16	28	2.2	3.8	4.9	1.6	.2	3.0L	w194302
w194303	.2	610	61	59	2.4	5.9	3.2	2.5	.4	3.0L	w194303
w194304	.1	200	24	14L	1.5	1.1	2.2	.40	.1	3.0L	w194304
w194305	.1	400	34	22	.90	3.0	6.1	1.3	.2	3.0L	w194305
w194852	.1	300	170	40L	.40	2.5	1.0	.90	.2	3.0L	w194852
w194853	.2	700	46	57L	.70	5.3	2.7	2.7	.4	3.0	w194853
w194854	.1	300	810	45L	.70	3.4	4.0	2.0	.3	3.0L	w194854
w194855	.1	300	5	32L	.20	.90	1.6	.60	.1	3.0L	w194855
w193945	.1	430	24	17L	.20	2.4	2.4	1.3	.2	3.0L	w193945
w193946	.1	270	36	17L	1.1	3.2	2.3	1.4	.2	5.0	w193946
w193947	.1	100	51	11L	.50	2.2	2.3	1.3	.2	3.0L	w193947
w193948	.3	230	29	17L	2.2	3.2	2.2	2.3	.5	3.0L	w193948
w193949	.2	560	780	19	.60	3.4	3.1	1.8	.3	5.0	w193949
w193950	.1	430	49	19	1.5	2.6	4.2	1.3	.2	3.0L	w193950
w193989	.1	360	31	B	.30	2.6	3.2	1.3	.2	3.0L	w193989
w193990	.1	380	84	B	.40	2.6	2.9	1.6	.3	3.0L	w193990
w196283	.1	200	24	21L	.60	1.9	6.4	.50	.5L	3.0L	w196283
w196284	.1	200	20	27L	.90	4.1	7.6	2.3	.4	3.0L	w196284
w196285	.1	500	21	29L	1.4L	2.3	4.3	1.7	.3	3.0L	w196285
w196286	.2	690	67	43	.90	7.4	4.6	3.3	.5	6.0	w196286
w196287	.1	300	28	28L	.80	1.9	2.3	1.0	.2	3.0L	w196287
w196288	.1	400	24	12	.30	2.6	7.2	1.7	.3	3.0L	w196288
w196289	.1	300	780	33L	1.1L	1.9	1.2	1.1	.5L	3.0L	w196289
w196290	.2	410	30	39	1.6	4.3	2.2L	2.2	.3	3.0L	w196290
w195439	.1	200	16	11	.50	1.7	4.2	1.0	.2	3.0L	w195439

Table 9g.--Content of 22 trace elements in 83 bituminous coal samples from Virginia--continued

Sample number	U (ppm)	Yb (ppm)
w193932	0.70	0.6
w193933	.90	.8
w193934	1.4	.8
w193935	2.3	1.1
w193936	.90	.9
w194292	2.3	1.0
w194293	3.3	.7
w194294	2.1	.5
w194295	3.0	1.4
w194296	1.7	.5
w194297	1.1	.4
w194298	2.5	.7
w194299	1.6	.3
w194300	3.3	.7
w194301	2.5	1.2
w194302	3.6	.8
w194303	3.8	1.1
w194304	2.2	.3
w194305	1.8	.7
w194852	1.0	.7
w194853	1.7	1.3
w194854	1.9	.9
w194855	.90	.3
w193945	1.2	.7
w193946	1.2	.8
w193947	.90	.6
w193948	1.3	2.0
w193949	1.6	.9
w193950	2.7	.6
w193989	1.5	.6
w193990	1.8	.9
w196283	.80	.4
w196284	2.4	.9
w196285	1.2	.8
w196286	2.9	1.6
w196287	1.9	.5
w196288	1.6	.7
w196289	1.2	.5
w196290	1.2	1.2
w195439	1.2	.5

Table 9g.--Content of 22 trace elements in 83 bituminous coal samples from Virginia--continued

Sample number	As (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	La (ppm)	Sample number
w195440	15	60	10	53	3.8	0.71	160	4.0	0.10	38	w195440
w195441	2.0	14	14	9.8	.5	.35	59	.4	.090	7	w195441
w195442	3.0	23	5.4	23	1.5	.38	150	.8	.090	14	w195442
w195443	2.0	13	1.9	7.8	.9	.17	96	.4	.16	8	w195443
w195444	6.0	11	6.1	8.6	.4	.27	48	.3	.13	6	w195444
w195445	33	33	14	22	2.0	.59	130	1.6	.33	18	w195445
w195446	4.0	70	3.5	56	3.4	.90	260	3.3	.14	41	w195446
w195447	4.0	16	3.4	12	.4	.24	48	.7	.10	9	w195447
w194411	2.0	7.0	2.6	3.7	.3	.17	20L	.3L	.010L	3	w194411
w194412	2.0	8.0	6.6	4.4	.3	.15	20L	.4	.010L	5	w194412
w197299	29	9.0	1.2	8.1	.3	.16	28	.4	.29	5	w197299
w197300	3.0	13	7.7	7.4	.1	.26	29	.6	.020	7	w197300
w197301	17	23	12	17	1.2	.52	20L	.7	.040	11	w197301
w197302	10	24	9.6	22	1.0	.52	1,900	.6	.040	11	w197302
w197303	2.0	13	7.7	10	1.1	.22	860	.5	.010L	7	w197303
w197304	7.0	8.0	5.1	6.0	.4	.17	200	.4	.010L	4	w197304
w197305	17	6.0	5.0	5.5	.4	.17	68	.3	.010L	3	w197305
w197306	2.0	11	7.4	6.2	.5	.20	60	.6	.010L	6	w197306
w197308	11	15	9.1	11	.9	.27	20L	.6	.010	8	w197308
w195111	76	16	7.3	13	1.5	.29	96	.5	.80	8	w195111
w195112	61	43	11	38	5.2	.69	180	1.6	.47	24	w195112
w195113	2.0	27	3.9	18	.6	.45	76	1.2	.38	17	w195113
w195114	2.0	19	8.0	15	1.6	.45	48	.5	.25	9	w195114
w195115	10	45	9.3	42	6.1	.70	290	1.8	.30	25	w195115
w195116	160	11	4.0	7.2	1.4	.19	72	.4	.74	5	w195116
w195117	20	34	8.3	21	2.2	.52	150	2.0	.17	19	w195117
w195118	45	5.0	1.2	2.9	.4	.10	26	.1	.81	3	w195118
w195119	18	17	4.1	10	1.6	.29	92	.6	.19	9	w195119
w195120	9.0	8.0	2.0	4.7	.7	.15	42	.3	.21	4	w195120
w195121	15	54	9.3	45	7.1	.88	350	1.9	.25	31	w195121
w195122	5.0	11	7.5	7.2	.7	.24	130	.2	.36	4	w195122
w195123	59	8.0	3.2	6.1	.9	.17	120	.3	.45	4	w195123
w195124	14	21	4.6	14	2.4	.35	92	.5	.38	9	w195124
w195125	1.0	19	8.0	12	1.2	.31	88	.7	.22	10	w195125
w195126	4.0	33	8.0	32	2.9	.57	320	1.3	.45	19	w195126
w195127	13	19	6.3	16	3.3	.31	120	.7	.31	10	w195127
w195128	17	13	5.8	12	1.5	.24	120	.9	.58	8	w195128
w195129	2.0	38	3.5	12	2.5	.84	100	1.0	.51	18	w195129
w195130	15	42	9.0	36	5.5	.67	250	1.4	.86	23	w195130
w195133	1.0	34	2.2	24	.5	.42	140	1.7	.17	21	w195133

Table 9g.--Content of 22 trace elements in 83 bituminous coal samples from Virginia--continued

Sample number	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Th (ppm)	Sample number
w195440	0.4	610	250	75	1.1	10	4.3	4.3	0.6	12	w195440
w195441	.1	200	10	27L	1.6	2.7	2.0	1.7	.3	3.0L	w195441
w195442	.2	290	62	49	.60	4.2	2.9	2.2	.3	3.0L	w195442
w195443	.1	300	35	18	.40	2.0	.9	1.2	.2	3.0L	w195443
w195444	.1	300	25	23L	.70	2.2	1.3	1.3	.2	3.0L	w195444
w195445	.2	300	29	29	1.1	4.8	3.0	3.2	.4	4.0	w195445
w195446	.4	710	36	76	.60	11	4.9	5.3	.7	12	w195446
w195447	.1	200	140	22L	.40	2.7	1.4	1.3	.2	3.0L	w195447
w194411	.1	200	B	13L	.30	1.5	1.3	.80	.3L	3.0L	w194411
w194412	.1	400	9	15L	.30	1.7	4.4	.80	.1	3.0L	w194412
w197299	.1	100	50	18L	.30	2.0	2.6	.70	.1	3.0L	w197299
w197300	.1	200	76	15L	2.0	2.6	4.2	1.2	.2	3.0L	w197300
w197301	.2	200	37	19	1.0	4.4	2.0	2.5	.5	3.0L	w197301
w197302	.2	200	65	24L	.80	5.5	2.4	2.5	.4	3.0L	w197302
w197303	.1	600	15	16	.90	3.4	4.3	1.1	.2	3.0L	w197303
w197304	.1	400	11	19L	1.2	1.4	2.3	.80	.2	3.0L	w197304
w197305	.1	200	13	19L	1.8	1.4	2.1	.70	.2	3.0L	w197305
w197306	.1	300	14	20L	.40	1.5	3.1	1.0	.2	3.0L	w197306
w197308	.1	200	26	20L	.40	2.7	1.4	1.4	.2	3.0L	w197308
w195111	.1	300	24	23	1.4	2.8	3.9	1.6	.2	5.0	w195111
w195112	.3	1,500	44	94	1.0	8.6	1.6	3.6	.5	3.0L	w195112
w195113	.2	400	150	34L	.30	4.3	2.3	2.2	.2	3.0L	w195113
w195114	.2	400	27	35L	.30	3.0	1.2	2.0	.3	3.0L	w195114
w195115	.3	1,400	97	130	.90	9.5	1.1	3.7	.5	6.0	w195115
w195116	.1	200	39	16	1.6	1.8	2.0	1.0	.2	3.0L	w195116
w195117	.2	410	120	37	.60	5.1	2.3	2.9	.4	3.0L	w195117
w195118	.1L	100	19	18L	.40	.60	1.8	.50	.1	3.0L	w195118
w195119	.1	300	45	23	.50	2.5	1.0	1.6	.2	3.0L	w195119
w195120	.1	200	17	13	.20	1.1	1.0	.70	.1	3.0L	w195120
w195121	.3	1,300	59	130	1.1	9.6	1.5	4.8	.6	3.0	w195121
w195122	.1	200	11	21L	.40	1.9	1.0	1.1	.2	3.0L	w195122
w195123	.1	200	16	25L	.70	1.4	1.8	.80	.1	3.0L	w195123
w195124	.2	200	32	27L	.50	2.9	2.2	1.9	.2	3.0L	w195124
w195125	.1	300	19	27L	.30	2.3	.8	1.6	.2	3.0L	w195125
w195126	.2	890	85	84	.40	7.1	1.6	3.1	.4	3.0L	w195126
w195127	.1	700	33	44	.70	3.6	1.9	1.8	.2	3.0L	w195127
w195128	.1	500	29	29	.40	2.4	1.1	1.3	.2	3.0L	w195128
w195129	.3	400	64	34	.70	4.6	2.4	4.6	.7	4.0	w195129
w195130	.3	800	46	130	1.2	7.8	1.4	3.8	.4	10	w195130
w195133	.2	300	630	23L	.50	5.4	4.0	2.3	.3	4.0	w195133

Table 9g.--Content of 22 trace elements in 83 bituminous coal samples from Virginia--continued

Sample number	U (ppm)	Yb (ppm)
w195440	3.8	2.3
w195441	1.4	.9
w195442	2.1	.8
w195443	3.3	.6
w195444	1.2	.7
w195445	2.5	1.4
w195446	4.3	2.2
w195447	1.5	.6
w194411	1.0	.5
w194412	1.4	.5
w197299	1.4	.4
w197300	1.6	.7
w197301	1.6	1.4
w197302	1.8	1.2
w197303	1.5	.7
w197304	1.0	.6
w197305	1.0	.5
w197306	1.3	.6
w197308	1.9	.6
w195111	2.8	.7
w195112	4.3	1.7
w195113	2.7	.9
w195114	1.7	1.0
w195115	4.1	1.8
w195116	2.2	.4
w195117	2.7	1.3
w195118	.70	.2
w195119	1.8	.7
w195120	1.1	.3
w195121	5.8	1.9
w195122	1.3	.6
w195123	1.5	.4
w195124	3.1	.8
w195125	1.4	.8
w195126	2.9	1.3
w195127	2.3	.7
w195128	1.2	.6
w195129	3.9	1.6
w195130	4.6	1.5
w195133	2.7	1.0

Table 9g.--Content of 22 trace elements in 83 bituminous coal samples from Virginia--continued

Sample number	As (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	La (ppm)	Sample number
W195134	2.0	17	5.8	14	3.0	0.28	130	0.7	0.020	7	W195134
W195135	28	5.0	3.7	3.9	.4	.11	20	.2	.19	2	W195135
W195137	12	41	4.5	28	1.7	.75	56	1.8	.070	22	W195137

Table 9g.--Content of 22 trace elements in 83 bituminous coal samples from Virginia--continued

Sample number	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Th (ppm)	Sample number
w195134	0.1	200	12	30	0.70	3.2	1.5	1.5	0.2	3.0L	w195134
w195135	.1	97	15	19L	.90	.80	1.3	.50	.1	3.0L	w195135
w195137	.3	400	100	40	1.4	5.8	5.6	3.8	.6	5.0	w195137

Table 9g.--Content of 22 trace elements in 83 bituminous coal samples from Virginia--continued

Sample number	U (ppm)	Yb (ppm)
w195134	1.3	0.8
w195135	1.2	.3
w195137	2.3	1.7

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis.

[Values in percent or parts-per-million. 22 values are from direct determinations on whole-coal; all other values calculated from analyses of ash. S means analysis by emission spectography; L, less than the value shown; N, not detected; B, not determined.]

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w193932	0.49	0.37	0.093	0.032	0.005	0.048	0.32	0.019	0.01	2.0	w193932
w193933	.83	.51	.57	.045	.032	.037	.48	.041	.03	6.0	w193933
w193934	1.5	.81	1.7	.12	.073	.071	.75	.062	.02	15	w193934
w193935	3.3	2.5	.48	.062	.093	.23	.43	.13	.03	13	w193935
w193936	3.5	1.8	.31	.11	.027	.33	.88	.13	.03	16	w193936
w194292	4.3	2.4	.11	.066	.031	.30	.51	.17	.05	15	w194292
w194293	B	B	B	.020	.035	B	B	B	.03	1.0	w194293
w194294	1.3	.69	.041	.018	.025	.043	.36	.047	.02	14	w194294
w194295	5.9	3.1	.087	.092	.040	.40	.43	.28	.04	2.0	w194295
w194296	1.1	.63	.039	.044	.045	.16	.80	.025	.01	14	w194296
w194297	.54	.31	.033	.012	.030	.056	.32	.019	.01	16	w194297
w194298	1.5	.89	.030	.056	.030	.24	.59	.037	.02	12	w194298
w194299	B	B	B	.010	.030	B	B	B	.01	8.0	w194299
w194300	1.6	1.1	.053	.019	.035	.042	.21	.068	.03	1.0	w194300
w194301	3.1	1.6	.058	.039	.030	.20	.67	.17	.03	55	w194301
w194302	2.6	1.9	.056	.086	.060	.51	.86	.067	.02	38	w194302
w194303	5.9	3.1	.095	.26	.061	.94	1.4	.14	.02L	170	w194303
w194304	.42	.16	.092	.014	.020	.029	.32	.007	.02	7.0	w194304
w194305	5.7	3.0	.14	.26	.040	.84	2.5	.19	.05	35	w194305
w194852	.84	.68	.070	.019	.030	.048	1.2	.049	.02	15	w194852
w194853	4.3	2.8	.083	.11	.070	.62	.55	.13	.07	4.0	w194853
w194854	1.6	1.5	.17	.041	.030	.22	.34	.075	.03	4.0	w194854
w194855	.57	.32	.050	.013	.030	.008	.15	.030	.02	1.0	w194855
w193945	1.6	.89	.11	.050	.043	.028	.40	.084	.03	4.0	w193945
w193946	1.6	.90	.15	.047	.027	.11	.52	.066	.04	5.0	w193946
w193947	1.5	.98	.058	.012	.010	.093	.19	.067	.03	8.0	w193947
w193948	1.1	.83	.059	.022	.023	.17	2.1	.039	.06	110	w193948
w193949	2.7	1.4	.067	.071	.056	.24	.37	.10	.03	2.0	w193949
w193950	2.0	1.3	.17	.060	.043	.30	.92	.050	.03	120	w193950
w193989	1.4	.99	.47	.093	.036	.097	.34	.056	.05	4.0	w193989
w193990	1.2	.88	.45	.083	.038	.036	.32	.074	.03	5.0	w193990
w196283	1.9	1.2	.038	.032	.020	.18	.31	.084	.05	78	w196283
w196284	.63	.61	.13	.032	.020	.091	1.7	.031	.03	8.0	w196284
w196285	1.8	1.0	.21	.047	.050	.14	.36	.066	.20	1.0	w196285
w196286	5.6	3.8	.087	.12	.069	.84	.40	.17	.09	1.0	w196286
w196287	1.3	.85	.092	.043	.030	.12	3.1	.055	.06	16	w196287
w196288	2.0	1.1	.077	.044	.040	.16	.20	.069	.05	2.0	w196288
w196289	1.1	.73	.16	.020	.030	.051	.14	.052	.03	2.0	w196289
w196290	4.5	2.2	.063	.22	.041	.77	.79	.12	.03	7.0	w196290
w195439	1.1	.80	.067	.049	.020	.14	.33	.034	.01	2.0	w195439

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis--continued

Sample number	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Dy-S (ppm)	Sample number
w193932	1.7	23	1.5	0.00	11	4.5	4.9	0.3	9.9	0.9L	w193932
w193933	4.3	52	1.7	.04	15	8.9	9.0	.5	17	1.8L	w193933
w193934	11	110	.9	.08	17	6.2	10	.3	15	3.8L	w193934
w193935	15	150	2.4	.10	24	3.8	21	.9	24	5.4L	w193935
w193936	18	120	1.4	.03	24	5.3	22	2.4	15	4.8L	w193936
w194292	10	110	2.6	.06	27	9.5	23	2.1	21	5.3L	w194292
w194293	5.2	57	1.8	.02	16	9.0	15	.4	14	2.3L	w194293
w194294	5.0	41	1.9	.03	9.0	2.1	5.9	.2	9.9	1.7L	w194294
w194295	16	120	4.0	.05	30	13	33	2.1	21	6.7L	w194295
w194296	11	110	1.0	.06	8.0	4.1	6.4	.9	14	1.8L	w194296
w194297	7.3	26	1.9	.13	5.0	6.9	3.5	.4	17	.9L	w194297
w194298	8.4	47	2.3	.09	11	5.7	8.8	1.6	17	2.2L	w194298
w194299	4.4	19	1.8	.04	3.0	3.0	3.2	.2	9.5	.7L	w194299
w194300	5.0	44	1.7	.04	16	6.9	16	.4	13	2.1L	w194300
w194301	8.5	97	7.4	.04	18	7.6	18	1.4	28	3.7L	w194301
w194302	16	81	1.7	.07	17	3.9	16	2.9	20	3.9L	w194302
w194303	26	140	3.5	.09	27	8.6	25	4.1	26	7.5L	w194303
w194304	3.2	23	1.6	.03	4.0	5.7	2.8	.2	7.6	.7L	w194304
w194305	28	210	8.0	.13	15	6.9	12	1.6	31	8.3L	w194305
w194852	9.3	37	.8	.12	10	12	8.8	.3	8.1	1.9L	w194852
w194853	19	170	1.6	.10	31	6.1	21	2.7	24	5.6L	w194853
w194854	14	180	.9	.13	22	7.2	15	.9	26	2.7L	w194854
w194855	5.8	33	1.6	.02	6.0	6.6	3.7	.8L	11	.8L	w194855
w193945	14	77	1.4	.02	15	3.9	11	.2	15	2.2L	w193945
w193946	10	89	1.8	.03	14	10	11	.4	19	2.4L	w193946
w193947	3.9	32	.9	.01	15	3.2	9.5	.4	8.1	2.0L	w193947
w193948	N	42	3.1	.15	17	16	9.8	1.0	44	2.7L	w193948
w193949	13	77	1.4	.03	22	4.7	14	1.5	20	3.4L	w193949
w193950	8.7	64	2.5	.04	15	4.1	11	1.8	17	3.2L	w193950
w193989	5.7	100	1.4	.09	15	8.0	12	.7	17	2.5L	w193989
w193990	5.2	69	.8	.04	19	7.4	12	.4	20	2.2L	w193990
w196283	12	50	1.6	.08	5.0	2.2	5.7	.3	21	2.5L	w196283
w196284	24	96	1.7	.10	26	15	21	.6	14	2.0L	w196284
w196285	16	190	.8	.27	18	11	10	.6	28	2.5L	w196285
w196286	28	190	3.3	.10	36	13	35	2.0	37	7.0L	w196286
w196287	19	79	1.1	.30	12	2.2	12	.8	16	3.4L	w196287
w196288	18	100	1.2	.07	18	2.3	9.7	1.2	18	2.5L	w196288
w196289	16	140	1.0	.14	13	16	9.3	.3	11	1.6L	w196289
w196290	19	100	5.5	.10	26	14	19	2.6	17	5.5L	w196290
w195439	8.3	45	1.1	.06	9.0	7.3	8.7	.8	14	1.1L	w195439

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis--continued

Sample number	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	In-S (ppm)	La (ppm)	Sample number
w193932	0.3L	0.20	24	1.5	0.41	4.6	0.3	0.010	0.20L	5	w193932
w193933	.8	.26	23	1.9	1.5	.86	.6	.060	.40L	8	w193933
w193934	1.2L	.30	29	.7	1.3	.59L	.7	.11	.83L	10	w193934
w193935	2.0	.43	58	4.6	1.2L	.85L	1.3	.080	1.2L	13	w193935
w193936	1.5L	.38	110	4.4	1.1L	.76L	1.2	.80	1.1L	13	w193936
w194292	1.7	.41	130	5.4	1.2L	1.3	1.2	.11	1.2L	16	w194292
w194293	1.0	.28	39	3.6	.51L	3.9	.7	.040	.51L	9	w194293
w194294	.6	.15	30	3.4	.62	.73	.4	.020	.36L	6	w194294
w194295	2.1L	.49	130	11	1.5L	12	1.8	.010L	1.5L	18	w194295
w194296	.6L	.19	44	3.0	.57	.29	.2	.10	.40L	4	w194296
w194297	.3L	.14	20	2.5	.62	.84	.2	.060	.19L	2	w194297
w194298	.7L	.24	66	4.4	.63	.70	.3	.070	.49L	6	w194298
w194299	.4	.09	20L	1.7	.46	2.1	.3L	.040	.15L	2	w194299
w194300	.7	.27	34	2.9	.67	3.5	.7	.030	.47L	9	w194300
w194301	1.2L	.39	64	6.7	1.3	2.6	1.4	.16	.81L	10	w194301
w194302	1.2L	.30	120	6.8	.86L	1.4	.6	.070	.86L	9	w194302
w194303	2.3L	.47	200	10	1.6L	1.2L	1.1	.13	1.6L	15	w194303
w194304	.2L	.11	30	1.3	.71	2.1	.1	.040	.16L	2	w194304
w194305	2.6L	.28	94	12	2.1	2.6	.6	.17	1.8L	8	w194305
w194852	.6L	.20	60	3.0	.87	1.2	.4	.24	.41L	5	w194852
w194853	2.1	.51	92	8.5	1.9	.87	1.1	.12	1.2L	17	w194853
w194854	.8L	.39	76	4.5	.67	2.0	.7	.28	.59L	12	w194854
w194855	.3L	.12	20L	1.5	.55	1.0	.3	.10	.18L	4	w194855
w193945	.9	.29	29	1.9	1.2	.35L	.8	.040	.49L	9	w193945
w193946	.7	.29	39	3.8	.89	1.3	.6	.020	.52L	8	w193946
w193947	.6L	.25	39	2.5	.43	.43	.6	.13	.43L	8	w193947
w193948	1.2	.56	44	3.4	1.5	.75	.4	.25	.58L	8	w193948
w193949	1.1L	.36	74	4.4	.74L	.53L	.9	.020	.74L	12	w193949
w193950	1.0L	.26	85	3.8	.71L	.51L	.4	.37	.71L	7	w193950
w193989	.8L	.25	33	3.9	.86	1.2	.6	.010L	.55L	9	w193989
w193990	.7L	.30	30	3.5	.48L	.35L	.8	.020	.48L	12	w193990
w196283	.8L	.10	68	6.0	.55L	2.1	.4	.20	.55L	3	w196283
w196284	.6L	.53	160	3.8	.45L	7.0	1.0	.26	.45L	14	w196284
w196285	.8L	.38	72	4.2	1.0	.40L	.7	.090	.55L	10	w196285
w196286	2.2L	.65	300	12	1.7	1.1L	1.5	.030	1.5L	20	w196286
w196287	1.1L	.23	68	3.3	.75L	.75	.5	.24	.75L	6	w196287
w196288	.8L	.37	220	4.0	.54L	.39	.8	.060	.54L	10	w196288
w196289	.6	.22	200	2.4	.87	1.4	.5	.10	.36L	8	w196289
w196290	1.7L	.46	220	8.7	1.2L	7.4	1.0	.070	1.2L	14	w196290
w195439	.5L	.19	76	1.3	.52	.73	.2	.16	.36L	5	w195439

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	P (ppm)	Pb (ppm)	Pr-S (ppm)	Sample number
w193932	6.1	0.1	10	0.55	0.29	2.2	3.5	10	2.3	2.0L	w193932
w193933	7.4	.1	19	1.9	1.1	2.6L	6.3	30	1.7	3.9L	w193933
w193934	11	.1	46	1.9	1.2	5.4L	5.8	77	1.2	8.0L	w193934
w193935	29	.2	22	2.7	4.1	7.8L	8.3	140	9.1	11L	w193935
w193936	21	.2	33	.76	3.5	8.9	7.2	66	3.8	10L	w193936
w194292	41	.2	9.7	1.3	2.6	15	16	340	12	11L	w194292
w194293	16	.1	5.2	.58	1.2	8.0	20	B	9.5	5.0L	w194293
w194294	8.8	.1	3.5	2.4	1.2	7.3	10	18	3.4	3.5L	w194294
w194295	110	.2	9.7	.63L	3.8	15	23	220	14	14L	w194295
w194296	9.1	.1	43	2.5	.34	3.9	6.8	17	3.0	3.9L	w194296
w194297	2.2	.1	5.1	1.2	.27	3.5	7.6	19	1.6	1.8L	w194297
w194298	7.0	.1	12	2.9	.42	6.9	9.8	21	4.7	4.8L	w194298
w194299	1.6	.1	2.9	2.3	.17	2.5	5.7	B	1.6	1.4L	w194299
w194300	17	.1	6.0	.54	1.3	6.4	15	12	5.1	4.6L	w194300
w194301	21	.2	11	1.4	4.3	5.3L	10	15	7.3	7.9L	w194301
w194302	9.7	.1	9.0	2.5	.74	8.0	8.6	16	5.9	8.4L	w194302
w194303	21	.2	54	2.6	1.2	14	16	61	9.4	16L	w194303
w194304	1.2	.1	30	3.0	.37	2.3	6.2	24	1.3	1.6L	w194304
w194305	19	.1	57	3.4	2.6	22	26	34	9.8	18L	w194305
w194852	4.7	.1	8.7	.87	1.2	2.7L	10	170	2.0	3.9L	w194852
w194853	19	.2	28	.87	2.8	19	13	46	10	12L	w194853
w194854	15	.1	12	.84	1.0	7.6	10	810	8.4	5.7L	w194854
w194855	2.3	.1	13	.38	1.0	2.8	11	5	1.8	1.7L	w194855
w193945	13	.1	9.8	.98	2.7	9.8	5.5	24	2.9	4.8L	w193945
w193946	9.6	.1	16	1.5	1.2	4.7	9.6	36	4.3	5.0L	w193946
w193947	16	.1	11	.99	1.1	5.5	6.8	51	4.7	4.2L	w193947
w193948	9.1	.3	17	2.8	.91	6.1	12	29	5.8	5.6L	w193948
w193949	20	.2	16	1.1	1.8	6.0	8.5	780	7.9	7.1L	w193949
w193950	14	.1	14	1.5	.81	5.4	4.8	49	3.0	6.9L	w193950
w193989	18	.1	33	1.0	.78	3.6L	7.1	31	5.9	5.3L	w193989
w193990	14	.1	19	.90	.97	3.2L	5.1	84	6.6	4.7L	w193990
w196283	24	.1	5.7	1.4	1.2	4.8	12	24	9.4	5.3L	w196283
w196284	7.7	.1	24	1.5	.83	2.9L	5.0	20	2.0	4.4L	w196284
w196285	10	.1	43	.87	.79	3.6L	26	21	7.3	5.4L	w196285
w196286	50	.2	31	1.3	4.6	28	15	67	18	15L	w196286
w196287	8.7	.1	18	12	2.9	7.4	6.8	28	2.6	7.3L	w196287
w196288	15	.1	5.1	.69	1.2	4.2	5.2	24	6.2	5.2L	w196288
w196289	5.6	.1	3.0	.77	2.0	4.0	19	780	2.9	3.5L	w196289
w196290	34	.2	43	.68	2.2	8.6	14	30	7.5	12L	w196290
w195439	6.8	.1	17	.31	.31	3.2	5.7	16	3.3	3.5L	w195439

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis--continued

Sample number	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	Sample number
w193932	7L	1.5	1.3	1.1	1.3	0.32	25	0.2	3.0L	0.29L	w193932
w193933	9L	1.1	2.0	1.2	1.5	.57	52	.3	3.0L	.57L	w193933
w193934	9L	1.1	2.2	3.9	1.7	.83L	99	.2	3.0L	1.2L	w193934
w193935	10	1.1	4.6	4.5	2.4	1.2L	100	.4	7.0	1.7L	w193935
w193936	32	.50	4.2	3.7	2.1	1.1L	130	.2	4.0	1.5L	w193936
w194292	27	.60	5.1	2.2	2.2	1.3	130	.3	3.0L	1.7L	w194292
w194293	22L	1.0	3.2	1.4	1.4	.51L	71	.2	3.0L	.73L	w194293
w194294	19L	.90	1.6	.8	.90	.36L	50	.1	3.0L	.52L	w194294
w194295	21	1.3	7.1	2.7	2.4	1.5L	130	.4	5.0	2.1L	w194295
w194296	20L	1.0	2.0	1.8	.80	.40L	46	.1	3.0L	1.5	w194296
w194297	18L	1.0	1.3	2.8	.60	.35	38	.1	3.0L	.27L	w194297
w194298	19	1.7	3.0	1.1	1.2	.49L	43	.2	3.0L	.70L	w194298
w194299	16L	1.5	.80	1.3	.40	.15L	34	.3L	3.0L	.48	w194299
w194300	19L	1.1	2.4	1.4	1.5	.47L	60	.2	3.0L	.67L	w194300
w194301	22L	1.2	4.0	3.0	1.9	.81L	44	.3	4.0	3.4	w194301
w194302	28	2.2	3.8	4.9	1.6	.86L	70	.2	3.0L	1.2L	w194302
w194303	59	2.4	5.9	3.2	2.5	1.6L	56	.4	3.0L	2.3L	w194303
w194304	14L	1.5	1.1	2.2	.40	.21	37	.1	3.0L	.23L	w194304
w194305	22	.90	3.0	6.1	1.3	1.8L	170	.2	3.0L	2.6L	w194305
w194852	40L	.40	2.5	1.0	.90	.41L	49	.2	3.0L	1.2	w194852
w194853	57L	.70	5.3	2.7	2.7	2.4	90	.4	3.0	1.7L	w194853
w194854	45L	.70	3.4	4.0	2.0	1.1	240	.3	3.0L	1.0	w194854
w194855	32L	.20	.90	1.6	.60	.18L	57	.1	3.0L	.38L	w194855
w193945	17L	.20	2.4	2.4	1.3	.63	110	.2	3.0L	.70L	w193945
w193946	17L	1.1	3.2	2.3	1.4	.81	130	.2	5.0	.74L	w193946
w193947	11L	.50	2.2	2.3	1.3	.81	44	.2	3.0L	.62L	w193947
w193948	17L	2.2	3.2	2.2	2.3	.58L	44	.5	3.0L	3.1	w193948
w193949	19	.60	3.4	3.1	1.8	1.4	83	.3	5.0	1.1L	w193949
w193950	19	1.5	2.6	4.2	1.3	.71L	60	.2	3.0L	1.7	w193950
w193989	B	.30	2.6	3.2	1.3	.78	86	.2	3.0L	.78L	w193989
w193990	B	.40	2.6	2.9	1.6	.69	69	.3	3.0L	.69L	w193990
w196283	21L	.60	1.9	6.4	.50	.55L	41	.5L	3.0L	1.2	w196283
w196284	27L	.90	4.1	7.6	2.3	.51	83	.4	3.0L	.64L	w196284
w196285	29L	1.4L	2.3	4.3	1.7	.55L	110	.3	3.0L	.79L	w196285
w196286	43	.90	7.4	4.6	3.3	1.5L	55	.5	6.0	2.2L	w196286
w196287	28L	.80	1.9	2.3	1.0	.75L	42	.2	3.0L	1.1L	w196287
w196288	12	.30	2.6	7.2	1.7	.54L	85	.3	3.0L	.77L	w196288
w196289	33L	1.1L	1.9	1.2	1.1	.36L	270	.5L	3.0L	.51L	w196289
w196290	39	1.6	4.3	2.2L	2.2	1.7	38	.3	3.0L	1.7L	w196290
w195439	11	.50	1.7	4.2	1.0	.10L	110	.2	3.0L	.26	w195439

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis--continued

Sample number	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w193932	0.70	3.8	2.5	0.6	2.3	2.2	w193932
w193933	.90	8.0	6.3	.8	3.2	13	w193933
w193934	1.4	8.4	5.8	.8	3.2	18	w193934
w193935	2.3	24	11	1.1	9.6	37	w193935
w193936	.90	20	5.7	.9	4.1	18	w193936
w194292	2.3	35	9.2	1.0	8.7	20	w194292
w194293	3.3	18	6.5	.7	5.1	12	w194293
w194294	2.1	13	6.8	.5	3.7	14	w194294
w194295	3.0	53	11	1.4	12	27	w194295
w194296	1.7	11	4.0	.5	17	4.4	w194296
w194297	1.1	4.9	3.8	.4	3.5	3.0	w194297
w194298	2.5	18	6.9	.7	24	6.5	w194298
w194299	1.6	7.1	3.8	.3	7.4	2.0	w194299
w194300	3.3	15	6.4	.7	4.8	12	w194300
w194301	2.5	20	6.8	1.2	4.5	59	w194301
w194302	3.6	27	4.6	.8	18	6.2	w194302
w194303	3.8	42	8.9	1.1	28	17	w194303
w194304	2.2	7.1	4.6	.3	8.7	3.0	w194304
w194305	1.8	39	11	.7	36	26	w194305
w194852	1.0	7.5	3.8	.7	6.4	11	w194852
w194853	1.7	33	10	1.3	19	23	w194853
w194854	1.9	18	4.5	.9	7.4	7.6	w194854
w194855	.90	4.3	2.8	.3	2.3	8.8	w194855
w193945	1.2	11	8.4	.7	2.2	36	w193945
w193946	1.2	14	5.6	.8	8.9	8.1	w193946
w193947	.90	12	2.9	.6	5.1	5.8	w193947
w193948	1.3	10	10	2.0	38	4.6	w193948
w193949	1.6	15	3.9	.9	12	9.5	w193949
w193950	2.7	14	3.7	.6	5.8	7.1	w193950
w193989	1.5	12	3.3	.6	22	9.4	w193989
w193990	1.8	7.6	4.4	.9	3.2	14	w193990
w196283	.80	16	3.0	.4	10	7.0	w196283
w196284	2.4	6.4	3.1	.9	7.7	6.3	w196284
w196285	1.2	7.4	2.9	.8	58	8.7	w196285
w196286	2.9	44	14	1.6	14	35	w196286
w196287	1.9	12	5.0	.5	32	21	w196287
w196288	1.6	11	2.9	.7	9.2	6.2	w196288
w196289	1.2	12	5.6	.5	5.6	15	w196289
w196290	1.2	22	7.5	1.2	21	14	w196290
w195439	1.2	3.9	1.9	.5	12	2.7	w195439

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis--continued

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w195440	9.0	4.2	0.12	0.14	0.061	0.71	0.64	0.48	0.03L	15	w195440
w195441	1.4	.97	.055	.021	.020	.12	.16	.053	.02	2.0	w195441
w195442	3.6	2.3	.066	.11	.029	.47	.43	.10	.01	3.0	w195442
w195443	3.6	1.9	.064	.077	.030	.38	.48	.096	.03	2.0	w195443
w195444	1.0	.67	.087	.042	.030	.10	.43	.034	.01	6.0	w195444
w195445	4.0	2.4	.19	.11	.030	.42	.80	.14	.02L	33	w195445
w195446	11	4.2	1.7	.26	.071	1.1	.93	.42	.04L	4.0	w195446
w195447	1.9	1.1	1.4	.073	.020	.091	.46	.087	.01L	4.0	w195447
w194411	B	B	B	.016	.020	B	B	B	.01	2.0	w194411
w194412	.73	.52	.046	.020	.040	.045	.21	.035	.02	2.0	w194412
w197299	1.1	.63	.058	.022	.010	.081	1.0	.036	.01	29	w197299
w197300	1.2	.75	.044	.013	.020	.034	.21	.051	.01	3.0	w197300
w197301	2.5	1.5	.16	.10	.020	.27	.66	.083	.02	17	w197301
w197302	2.1	1.4	.20	.086	.020	.22	.51	.072	.01	10	w197302
w197303	1.5	1.1	.54	.081	.060	.25	.53	.050	.01L	2.0	w197303
w197304	.66	.48	.29	.052	.040	.082	.45	.022	.02	7.0	w197304
w197305	.65	.46	.50	.045	.020	.085	.54	.023	.02	17	w197305
w197306	1.2	.73	.36	.057	.030	.14	.44	.045	.01	2.0	w197306
w197308	1.7	1.0	.55	.086	.020	.11	.49	.062	.01L	11	w197308
w195111	2.1	1.4	.086	.088	.030	.38	1.4	.062	.03	76	w195111
w195112	7.7	5.2	.13	.30	.15	1.4	1.5	.22	.03	61	w195112
w195113	3.6	1.8	.089	.079	.040	.15	.51	.14	.04	2.0	w195113
w195114	2.0	1.4	.083	.082	.040	.24	.39	.059	.02	2.0	w195114
w195115	9.0	5.9	.12	.30	.14	1.6	1.0	.24	.07	10	w195115
w195116	1.7	.86	.062	.057	.020	.27	1.5	.039	.03	160	w195116
w195117	6.7	2.2	.12	.094	.041	.49	.65	.21	.04	20	w195117
w195118	.29	.29	.091	.025	.010	.036	.47	.016	.02	45	w195118
w195119	2.0	1.0	.073	.062	.030	.30	.56	.061	.01	18	w195119
w195120	1.1	.58	.086	.046	.020	.13	.42	.036	.01	9.0	w195120
w195121	12	5.7	.18	.45	.13	1.8	1.5	.26	.04L	15	w195121
w195122	1.2	.83	.17	.078	.020	.22	.39	.034	.02	5.0	w195122
w195123	1.0	.60	.16	.069	.020	.15	1.5	.035	.01	59	w195123
w195124	2.3	1.5	.074	.092	.020	.37	.58	.074	.01L	14	w195124
w195125	2.1	1.2	.052	.060	.030	.16	.37	.071	.02	1.0	w195125
w195126	8.2	4.1	.14	.39	.089	1.4	1.4	.19	.03L	4.0	w195126
w195127	3.6	1.9	.087	.14	.070	.63	.85	.080	.02L	13	w195127
w195128	3.4	1.2	.12	.12	.050	.39	1.0	.072	.01L	17	w195128
w195129	3.7	1.6	.11	.077	.040	.32	.43	.080	.04	2.0	w195129
w195130	8.9	4.8	.15	.32	.080	1.4	1.3	.20	.03	15	w195130
w195133	3.6	2.0	.72	.090	.030	.083	.43	.21	.02L	1.0	w195133

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis--continued

Sample number	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Dy-S (ppm)	Sample number
w195440	13	140	2.7	0.05	60	10	53	3.8	31	6.7L	w195440
w195441	5.0	36	2.2	.02	14	14	9.8	.5	16	1.3L	w195441
w195442	10	82	1.3	.10	23	5.4	23	1.5	20	3.1L	w195442
w195443	12	84	1.6	.07	13	1.9	7.8	.9	19	2.9L	w195443
w195444	2.9	35	.8	.04	11	6.1	8.6	.4	13	1.1L	w195444
w195445	8.2	77	2.0	.07	33	14	22	2.0	26	3.6L	w195445
w195446	17	170	2.1	.13	70	3.5	56	3.4	34	9.2L	w195446
w195447	4.1	48	.4	.03	16	3.4	12	.4	15	2.5L	w195447
w194411	13	21	.5	.04	7.0	2.6	3.7	.3	9.5	.5L	w194411
w194412	8.8	48	1.1	.04	8.0	6.6	4.4	.3	12	.8	w194412
w197299	6.5	22	.8	.01	9.0	1.2	8.1	.3	5.9	1.2L	w197299
w197300	5.2	24	2.5	.06	13	7.7	7.4	.1	15	1.0L	w197300
w197301	13	54	2.0	.06	23	12	17	1.2	22	2.3L	w197301
w197302	16	54	1.2	.09	24	9.6	22	1.0	24	2.0L	w197302
w197303	8.2	130	1.3	.03	13	7.7	10	1.1	21	1.8L	w197303
w197304	2.5	73	4.7	.01	8.0	5.1	6.0	.4	9.0	.9L	w197304
w197305	2.1	49	6.6	.01	6.0	5.0	5.5	.4	8.2	.9L	w197305
w197306	5.9	45	2.5	.02	11	7.4	6.2	.5	16	1.4L	w197306
w197308	4.0	71	1.4	.02	15	9.1	11	.9	14	1.9L	w197308
w195111	4.8	200	1.3	.11	16	7.3	13	1.5	20	2.4L	w195111
w195112	29	260	2.4	.09	43	11	38	5.2	30	7.4L	w195112
w195113	5.4	75	1.5	.06	27	3.9	18	.6	28	2.9L	w195113
w195114	6.5	280	1.2	.05	19	8.0	15	1.6	13	2.0L	w195114
w195115	32	310	3.0	.07	45	9.3	42	6.1	29	8.2L	w195115
w195116	2.3	45	1.5	.08	11	4.0	7.2	1.4	15	2.0L	w195116
w195117	17	120	3.1	.07	34	8.3	21	2.2	33	4.8L	w195117
w195118	.8	57	.2	.05	5.0	1.2	2.9	.4	11	.6L	w195118
w195119	4.7	59	1.1	.08	17	4.1	10	1.6	28	1.9L	w195119
w195120	2.5	50	.6	.10	8.0	2.0	4.7	.7	14	1.1L	w195120
w195121	35	320	3.6	.32	54	9.3	45	7.1	43	9.9L	w195121
w195122	7.8	84	1.2	.03	11	7.5	7.2	.7	11	1.4L	w195122
w195123	6.2	71	1.1	.05	8.0	3.2	6.1	.9	14	1.7L	w195123
w195124	4.3	65	1.0	.07	21	4.6	14	2.4	23	2.3L	w195124
w195125	3.5	82	1.3	.04	19	8.0	12	1.2	13	1.9L	w195125
w195126	20	220	2.0	.08	33	8.0	32	2.9	21	7.2L	w195126
w195127	7.3	110	1.2	.12	19	6.3	16	3.3	20	3.3L	w195127
w195128	4.5	72	.9	.07	13	5.8	12	1.5	11	2.9L	w195128
w195129	4.7	80	1.9	.03	38	3.5	12	2.5	35	2.9	w195129
w195130	19	210	2.1	.25	42	9.0	36	5.5	27	7.7L	w195130
w195133	4.7	80	1.4	.02L	34	2.2	24	.5	37	3.4L	w195133

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis--continued

Sample number	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	In-S (ppm)	La (ppm)	Sample number
w195440	3.1L	0.71	160	8.5	2.1L	0.61	4.0	0.10	2.1L	38	w195440
w195441	.6L	.35	59	1.8	.71	1.3	.4	.090	.41L	7	w195441
w195442	1.4L	.38	150	3.6	1.3	.28L	.8	.090	.99L	14	w195442
w195443	1.3L	.17	96	3.6	1.5	.27	.4	.16	.93L	8	w195443
w195444	.5L	.27	48	1.6	.61	.56	.3	.13	.36L	6	w195444
w195445	1.6L	.59	130	3.9	1.3	.33	1.6	.33	1.1L	18	w195445
w195446	4.2L	.90	260	9.2	3.3	.83L	3.3	.14	2.9L	41	w195446
w195447	1.1L	.24	48	2.4	1.2	.22L	.7	.10	.78L	9	w195447
w194411	.2L	.17	20L	1.2	.34	.15	.3L	.010L	.15L	3	w194411
w194412	.4	.15	20L	2.3	.54	.65	.4	.010L	.24L	5	w194412
w197299	.5L	.16	28	2.2	.70	2.5	.4	.29	.38L	5	w197299
w197300	.6	.26	29	2.6	.99	1.5	.6	.020	.33L	7	w197300
w197301	1.1L	.52	20L	3.5	1.5	1.1	.7	.040	.74L	11	w197301
w197302	1.1	.52	1,900	3.2	1.0	.19L	.6	.040	.65L	11	w197302
w197303	.8L	.22	860	2.2	.92	1.3	.5	.010L	.59L	7	w197303
w197304	.4L	.17	200	3.3	.52	2.8	.4	.010L	.30L	4	w197304
w197305	.4L	.17	68	4.1	.53	6.6	.3	.010L	.29L	3	w197305
w197306	.6L	.20	60	1.8	.69	.25	.6	.010L	.44L	6	w197306
w197308	.9L	.27	20L	3.3	1.3	.34	.6	.010	.60L	8	w197308
w195111	1.1L	.29	96	3.6	1.7	.22L	.5	.80	.77L	8	w195111
w195112	3.4L	.69	180	10	4.0	.67L	1.6	.47	2.4L	24	w195112
w195113	1.3L	.45	76	3.8	1.6	.27L	1.2	.38	.94L	17	w195113
w195114	.9L	.45	48	2.5	1.3	.18L	.5	.25	.62L	9	w195114
w195115	3.7L	.70	290	11	4.1	.74L	1.8	.30	2.6L	25	w195115
w195116	.9L	.19	72	2.4	1.3	2.4	.4	.74	.63L	5	w195116
w195117	2.2L	.52	150	5.7	2.9	1.8	2.0	.17	1.5L	19	w195117
w195118	.3L	.10	26	.8	.19L	.68	.1	.81	.22	3	w195118
w195119	.9L	.29	92	2.9	1.2	.17	.6	.19	.60L	9	w195119
w195120	.5L	.15	42	1.2	.80	.30	.3	.21	.35L	4	w195120
w195121	4.5L	.88	350	13	5.4	.90L	1.9	.25	3.1L	31	w195121
w195122	.7L	.24	130	1.8	.98	.20	.2	.36	.46L	4	w195122
w195123	.8L	.17	120	1.7	1.6	.15L	.3	.45	.53L	4	w195123
w195124	1.0L	.35	92	2.8	1.1	.52	.5	.38	.72L	9	w195124
w195125	.9L	.31	88	2.2	.85	.17L	.7	.22	.60L	10	w195125
w195126	3.3L	.57	320	7.8	3.3	.65L	1.3	.45	2.3L	19	w195126
w195127	1.5L	.31	120	4.0	1.7	.30L	.7	.31	1.1L	10	w195127
w195128	1.3L	.24	120	1.8	1.2	.26L	.9	.58	.92L	8	w195128
w195129	1.3L	.84	100	2.4	2.5	.27L	1.0	.51	.94L	18	w195129
w195130	3.5L	.67	250	9.4	3.1	.70L	1.4	.86	2.4L	23	w195130
w195133	1.6L	.42	140	3.6	2.0	.31L	1.7	.17	1.1L	21	w195133

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	P (ppm)	Pb (ppm)	Pr-S (ppm)	Sample number
w195440	79	0.4	17	0.61L	9.5	15	13	250	17	21L	w195440
w195441	10	.1	3.3	.12L	.59	4.5	7.7	10	5.9	4.0L	w195441
w195442	23	.2	14	.71	.99	8.0	9.2	62	9.5	9.7L	w195442
w195443	10	.1	10	.80	1.3	9.7	8.6	35	7.8	9.0L	w195443
w195444	7.1	.1	16	.66	.26	3.4	4.9	25	2.6	3.5L	w195444
w195445	25	.2	210	1.1	.82	10	12	29	9.7	11L	w195445
w195446	54	.4	120	.83L	3.3	19L	6.7	36	20	28L	w195446
w195447	12	.1	84	.56	.78	5.2L	3.9	140	4.5	7.6L	w195447
w194411	1.9	.1	19	.82	.17	1.0	2.5	B	1.6	1.4L	w194411
w194412	4.4	.1	9.2	1.1	.95	2.8	7.5	9	3.4	2.3L	w194412
w197299	11	.1	11	1.5	1.1	3.9	3.7	50	2.8	3.7L	w197299
w197300	12	.1	2.4	1.2	1.6	5.2	13	76	4.4	3.2L	w197300
w197301	34	.2	21	1.2	1.6	10	12	37	7.0	7.2L	w197301
w197302	26	.2	23	1.0	1.1	8.0	9.3	65	7.6	6.3L	w197302
w197303	13	.1	45	.50	1.0	3.9L	5.5	15	5.7	5.7L	w197303
w197304	7.3	.1	37	.34	.30	2.0L	4.7	11	3.5	2.9L	w197304
w197305	9.0	.1	74	.37	.57	1.9L	5.3	13	5.7	2.8L	w197305
w197306	11	.1	29	.32	.63	2.9L	4.5	14	4.0	4.3L	w197306
w197308	9.5	.1	24	1.3	1.7	4.3	8.6	26	4.0	5.8L	w197308
w195111	18	.1	13	2.9	.99	8.3	11	24	5.5	7.5L	w195111
w195112	47	.3	44	.67L	3.4	20	19	44	13	23L	w195112
w195113	23	.2	17	.94	3.8	10	11	150	9.6	9.1L	w195113
w195114	13	.2	13	.80	1.1	9.8	11	27	4.5	6.1L	w195114
w195115	52	.3	41	.74	6.7	24	23	97	14	25L	w195115
w195116	11	.1	14	2.1	.54	6.0	5.2	39	4.7	6.1L	w195116
w195117	26	.2	35	1.1	6.2	19	11	120	8.1	15L	w195117
w195118	4.1	.1L	4.9	.92	.27	1.6	1.4	19	1.2	3.0	w195118
w195119	12	.1	14	1.4	1.1	8.5	7.1	45	4.3	5.8L	w195119
w195120	8.0	.1	14	.90	.85	4.8	3.7	17	2.6	3.4L	w195120
w195121	54	.3	67	1.8	6.3	39	26	59	18	31L	w195121
w195122	6.2	.1	11	.98	.52	6.1	7.2	11	3.8	4.4L	w195122
w195123	4.9	.1	15	2.7	1.1	5.4	5.6	16	2.3	5.1L	w195123
w195124	18	.2	22	.72	.72	7.4	5.3	32	5.8	7.0L	w195124
w195125	15	.1	13	.51	.77	5.4	8.0	19	4.3	5.8L	w195125
w195126	33	.2	91	.65L	2.9	20	15	85	12	22L	w195126
w195127	20	.1	33	1.2	.46	7.0L	8.8	33	6.2	10L	w195127
w195128	13	.1	52	.79	.66	6.0L	7.2	29	3.7	8.9L	w195128
w195129	21	.3	27	.40	.94	15	7.2	64	15	9.1L	w195129
w195130	38	.3	73	.70	1.4	19	18	46	13	24L	w195130
w195133	42	.2	69	.62	4.2	7.2L	7.5	630	11	11L	w195133

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis--continued

Sample number	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	Sample number
w195440	75	1.1	10	4.3	4.3	1.8	95	0.6	12	0.92L	w195440
w195441	27L	1.6	2.7	2.0	1.7	.18	40	.3	3.0L	.18L	w195441
w195442	49	.60	4.2	2.9	2.2	.43	40	.3	3.0L	.43L	w195442
w195443	18	.40	2.0	.9	1.2	.67	61	.2	3.0L	.40L	w195443
w195444	23L	.70	2.2	1.3	1.3	.10L	61	.2	3.0L	.20	w195444
w195445	29	1.1	4.8	3.0	3.2	.82	61	.4	4.0	.49L	w195445
w195446	76	.60	11	4.9	5.3	1.7	180	.7	12	1.2L	w195446
w195447	22L	.40	2.7	1.4	1.3	.67	110	.2	3.0L	.34L	w195447
w194411	13L	.30	1.5	1.3	.80	.04	25	.3L	3.0L	.06L	w194411
w194412	15L	.30	1.7	4.4	.80	.14	54	.1	3.0L	.10L	w194412
w197299	18L	.30	2.0	2.6	.70	.11L	37	.1	3.0L	1.9	w197299
w197300	15L	2.0	2.6	4.2	1.2	.24	61	.2	3.0L	.14L	w197300
w197301	19	1.0	4.4	2.0	2.5	.21	100	.5	3.0L	.32L	w197301
w197302	24L	.80	5.5	2.4	2.5	.28	93	.4	3.0L	.28L	w197302
w197303	16	.90	3.4	4.3	1.1	.17L	130	.2	3.0L	.25L	w197303
w197304	19L	1.2	1.4	2.3	.80	.09L	140	.2	3.0L	.13L	w197304
w197305	19L	1.8	1.4	2.1	.70	.08L	110	.2	3.0L	.12L	w197305
w197306	20L	.40	1.5	3.1	1.0	.13L	130	.2	3.0L	.19L	w197306
w197308	20L	.40	2.7	1.4	1.4	.17	140	.2	3.0L	.34	w197308
w195111	23	1.4	2.8	3.9	1.6	.22L	110	.2	5.0	.33L	w195111
w195112	94	1.0	8.6	1.6	3.6	.67	190	.5	3.0L	1.0L	w195112
w195113	34L	.30	4.3	2.3	2.2	1.2	170	.2	3.0L	.40L	w195113
w195114	35L	.30	3.0	1.2	2.0	.18L	140	.3	3.0L	.27L	w195114
w195115	130	.90	9.5	1.1	3.7	2.2	180	.5	6.0	1.1L	w195115
w195116	16	1.6	1.8	2.0	1.0	.18L	48	.2	3.0L	4.0	w195116
w195117	37	.60	5.1	2.3	2.9	1.8	130	.4	3.0L	.66L	w195117
w195118	18L	.40	.60	1.8	.50	.05L	160	.1	3.0L	.08L	w195118
w195119	23	.50	2.5	1.0	1.6	.17L	100	.2	3.0L	.26L	w195119
w195120	13	.20	1.1	1.0	.70	.10L	140	.1	3.0L	.15L	w195120
w195121	130	1.1	9.6	1.5	4.8	3.1	160	.6	3.0	1.3L	w195121
w195122	21L	.40	1.9	1.0	1.1	.13	210L	.2	3.0L	.33	w195122
w195123	25L	.70	1.4	1.8	.80	.15L	220	.1	3.0L	.23L	w195123
w195124	27L	.50	2.9	2.2	1.9	.21	66	.2	3.0L	.52	w195124
w195125	27L	.30	2.3	.8	1.6	.17	110	.2	3.0L	.26L	w195125
w195126	84	.40	7.1	1.6	3.1	.65L	180	.4	3.0L	.98L	w195126
w195127	44	.70	3.6	1.9	1.8	.30L	120	.2	3.0L	.46L	w195127
w195128	29	.40	2.4	1.1	1.3	.26L	110	.2	3.0L	.39L	w195128
w195129	34	.70	4.6	2.4	4.6	.54	88	.7	4.0	.40L	w195129
w195130	130	1.2	7.8	1.4	3.8	2.1	160	.4	10	1.0L	w195130
w195133	23L	.50	5.4	4.0	2.3	1.1	250	.3	4.0	.47L	w195133

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis--continued

Sample number	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w195440	3.8	31	8.2	2.3	16	61	w195440
w195441	1.4	6.5	4.9	.9	4.1	5.4	w195441
w195442	2.1	20	5.8	.8	31	14	w195442
w195443	3.3	16	6.0	.6	12	15	w195443
w195444	1.2	6.1	3.0	.7	6.6	4.0	w195444
w195445	2.5	20	4.8	1.4	14	11	w195445
w195446	4.3	34	7.9	2.2	14	32	w195446
w195447	1.5	7.4	2.9	.6	3.2	13	w195447
w194411	1.0	4.2	2.3	.5	5.7	1.4	w194411
w194412	1.4	5.1	3.2	.5	3.7	9.2	w194412
w197299	1.4	9.2	2.8	.4	4.6	8.1	w197299
w197300	1.6	11	5.6	.7	12	11	w197300
w197301	1.6	17	9.8	1.4	30	13	w197301
w197302	1.8	20	5.6	1.2	14	6.0	w197302
w197303	1.5	8.4	5.4	.7	3.4	10	w197303
w197304	1.0	5.2	3.1	.6	3.1	3.8	w197304
w197305	1.0	5.7	3.9	.5	4.9	6.2	w197305
w197306	1.3	5.7	4.0	.6	2.3	9.5	w197306
w197308	1.9	11	6.2	.6	5.1	20	w197308
w195111	2.8	14	4.7	.7	12	8.7	w195111
w195112	4.3	51	11	1.7	40	24	w195112
w195113	2.7	21	6.7	.9	4.4	23	w195113
w195114	1.7	20	6.9	1.0	11	8.0	w195114
w195115	4.1	52	15	1.8	36	63	w195115
w195116	2.2	9.0	3.2	.4	17	6.5	w195116
w195117	2.7	33	12	1.3	12	53	w195117
w195118	.70	2.4	1.7	.2	9.5	3.0	w195118
w195119	1.8	14	6.0	.7	15	9.4	w195119
w195120	1.1	6.5	3.2	.3	14	9.0	w195120
w195121	5.8	72	20	1.9	100	58	w195121
w195122	1.3	8.5	4.5	.6	7.2	4.6	w195122
w195123	1.5	9.0	4.3	.4	11	9.0	w195123
w195124	3.1	14	4.8	.8	27	7.4	w195124
w195125	1.4	10	3.1	.8	6.0	6.7	w195125
w195126	2.9	42	11	1.3	46	26	w195126
w195127	2.3	18	4.4	.7	17	7.9	w195127
w195128	1.2	9.0	2.6	.6	21	9.3	w195128
w195129	3.9	15	12	1.6	13	15	w195129
w195130	4.6	38	9.4	1.5	52	20	w195130
w195133	2.7	20	7.6	1.0	2.7	31	w195133

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis--continued

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w195134	3.3	1.7	0.099	0.14	0.020	0.61	0.63	0.092	0.03	2.0	w195134
w195135	.57	.29	1.1	.11	.010	.059	1.7	.019	.01L	28	w195135
w195137	5.7	2.4	.58	.15	.040	.42	.81	.18	.02L	12	w195137

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis--continued

Sample number	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Dy-S (ppm)	Sample number
w195134	8.7	110	1.8	0.10	17	5.8	14	3.0	17	3.1L	w195134
w195135	.9L	66	1.2	.08	5.0	3.7	3.9	.4	12	1.9L	w195135
w195137	7.6	120	2.0	.13	41	4.5	28	1.7	55	4.8L	w195137

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis--continued

Sample number	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	In-S (ppm)	La (ppm)	Sample number
w195134	1.4L	0.28	130	4.1	1.4	0.42	0.7	0.020	0.98L	7	w195134
w195135	.9L	.11	20	1.0	1.3	.17L	.2	.19	.61L	2	w195135
w195137	2.2L	.75	56	3.7	2.6	.44L	1.8	.070	1.5L	22	w195137

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	P (ppm)	Pb (ppm)	Pr-S (ppm)	Sample number
w195134	15	0.1	28	0.28L	0.42	7.3	6.0	12	5.7	9.5L	w195134
w195135	3.7	.1	37	1.8	.17L	4.0L	6.6	15	.87L	5.9L	w195135
w195137	31	.3	72	1.1	1.7	15	9.4	100	12	15L	w195137

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis--continued

Sample number	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	Sample number
w195134	30	0.70	3.2	1.5	1.5	0.28L	77	0.2	3.0L	0.42L	w195134
w195135	19L	.90	.80	1.3	.50	.17L	120	.1	3.0L	.26L	w195135
w195137	40	1.4	5.8	5.6	3.8	.87	130	.6	5.0	.65L	w195137

Table 9h.--Major, minor, and trace element composition of 83 bituminous coal samples from Virginia reported on whole-coal basis--continued

Sample number	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w195134	1.3	15	4.2	0.8	8.7	8.8	w195134
w195135	1.2	4.3	2.4	.3	9.6	4.6	w195135
w195137	2.3	26	7.0	1.7	15	18	w195137

Summary of analytical data on 49 Indiana bituminous coal samples

Data on 22 Indiana coal samples were reported by Swanson and others (1976) and on 108 Indiana coal samples by Zubovic and others (1979). The generalized distribution of the 49 coal samples is shown on figure 8. Statistical data on the 49 coal samples are given in tables 10a, b, and c; the analytical data in tables 10e, f, g, and h. Specific sample locations and descriptons are presented in table 10d.

In the following paragraphs the geometric means of the analytical data on the 49 Indiana coal samples are compared with the means for the 644 bituminous coal samples of this report.

Comparison of the geometric means for the proximate and ultimate analyses, (table 10a), shows higher mean values for moisture, volatile matter, ash, oxygen and sulfur for the Indiana coal samples. Only fixed carbon and carbon values are lower. The mean values for the heat of combustion, free-swelling index and ash-fusion temperatures are also lower in the Indiana coal samples. The higher volatile matter, higher oxygen, lower fixed carbon and lower free-swelling index mean values of the Indiana coal samples indicate that these coals have a lower average rank than does the average coal of this report.

Comparison of the geometric means for the oxides in ash, (table 10b), shows that only Fe_2O_3 is higher in the Indiana coal ash. The mean values for MnO are equal in the two data sets. The high Fe_2O_3 content of this ash (22 percent), derived from the high pyrite content of these coals, results in the lower than average values for the other major and minor ash-forming oxides.

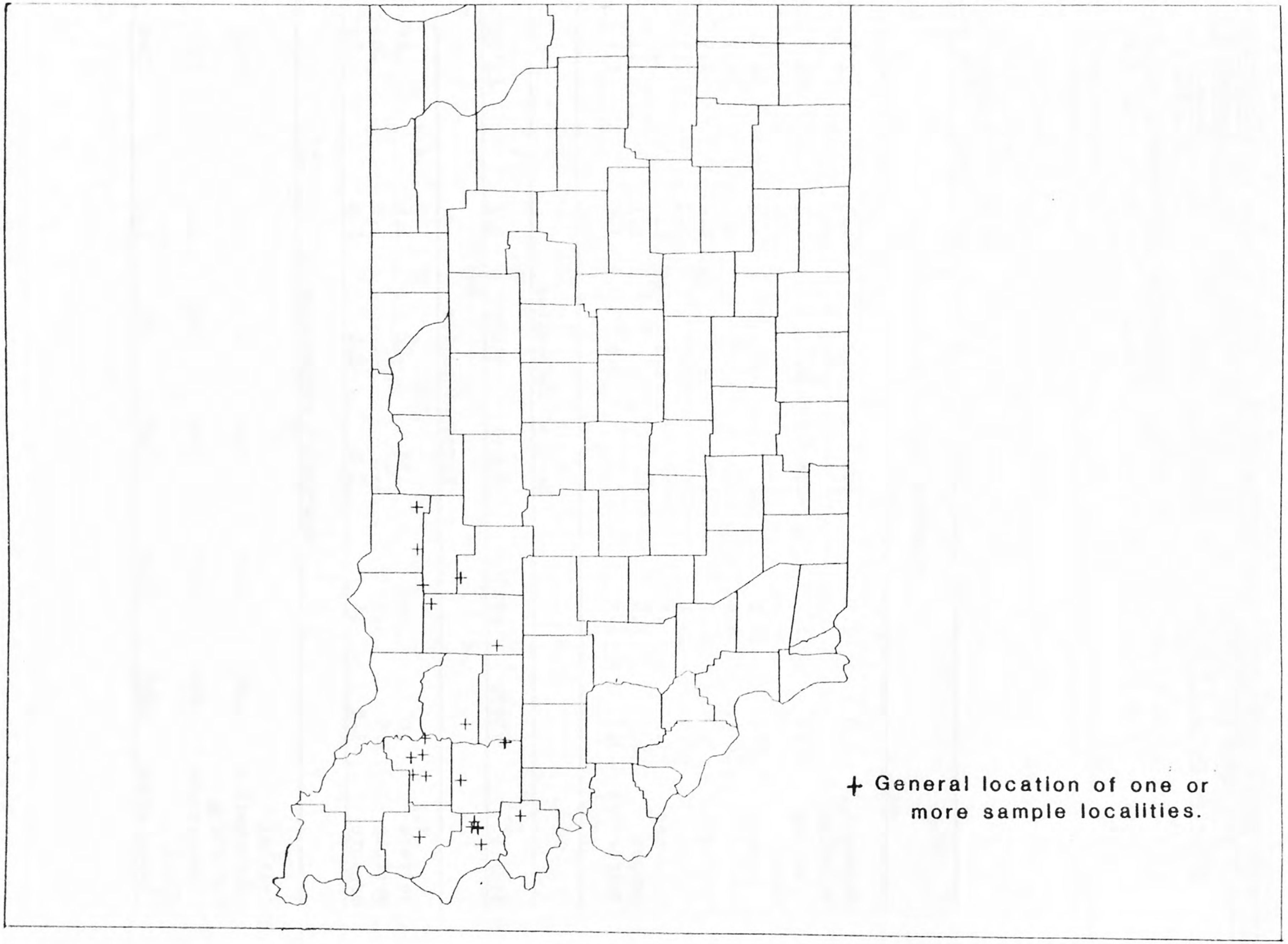

Figure 8.--Distribution of Indiana bituminous coal samples.

Table 10a.-- Arithmetic mean, observed range, geometric mean and geometric deviation of proximate and ultimate analyses, heat of combustion, forms of sulfur, ash-fusion temperatures and free-swelling index of 10 coal samples from Indiana.

[All values are in percent except Btu/lb, ash-fusion temperatures, and free-swelling index and are reported on the as-received basis. °F - 9/5°C + 32; Kcal/kg = 0.556 (Btu/lb).]

	Arithmetic mean	Observed range		Geometric mean	Geometric deviation	Geometric mean 548 samples
		Minimum	Maximum			
Proximate and ultimate analyses						
Moisture	4.0	2.1	6.2	3.8	1.5	2.5
Volatile matter	37.2	25	42.8	36.9	1.2	28.1
Fixed carbon	44.6	27.3	52	44.1	1.2	54.7
Ash	14.1	6.4	44.9	11.9	1.7	9.7
Hydrogen	5.0	3.5	5.6	4.9	1.1	4.9
Carbon	64.3	39.1	73	63.5	1.2	71.8
Nitrogen	1.3	.9	1.4	1.3	1.2	1.3
Oxygen	11	7.9	14	11	1.2	7.1
Sulfur	3.9	1.9	7.7	3.6	1.6	1.4
Heat of combustion						
Btu/lb	11630	6930	13010	11470	1.2	12730
Forms of sulfur						
Sulfate	.07	.01	.55	.02	3.4	.04
Pyritic	2.6	1.2	6.1	2.2	1.8	.62
Organic	1.2	.4	2.1	1.1	1.8	.76
Ash-fusion temperature °C						
Initial deformation	1190	1120	1340	1180	1.1	1260
Softening temperature	1240	1170	1400	1240	1.1	1300
Fluid temperature	1300	1240	1460	1300	1.1	1360

Table 10b.--Arithmetic mean, observed range, geometric mean, and geometric deviation of ash content and contents of eleven major and minor oxides in the laboratory ash of 49 coal samples of Indiana.

[All samples were ashed at 525°C; all data except geometric deviation are in percent; L means less than value shown.]

Oxide	Arithmetic mean	Observed range		Geometric mean	Geometric deviation	Geometric mean 644 samples
		Minimum	Maximum			
(Ash)	10	2.9	43	8.55	1.7	9.76
SiO_2	39	14	55	38	1.3	43
Al_2O_3	20	6.3	33	19	1.4	24
CaO	1.6	.4	11	.94	2.4	1.4
MgO	.57	.2	1.2	.53	1.5	.68
Na_2O	.23	.1L	.56	.19	1.6	.34
K_2O	1.6	.33	3.9	1.4	1.8	1.6
Fe_2O_3	26	3.2	65	22	1.9	11
MnO	.03	.01	.21	.02	2.2	.02
TiO_2	.95	.49	1.6	.92	1.3	1.1
P_2O_5	.18	.008	1.2	.11	3.0	.13
SO_3	1.6	.46	5.6	1.4	1.7	1.7

Comparison of the geometric means for trace elements, (table 10c), shows that only 5 elements (Cs, Cu, F, Ga and Mn) have approximately equal mean values in the two data sets. Silver, As, B, Be, Cd, Co, Ge, Nb, Nd, Pb, Sb, U and Zn have higher mean values in the Indiana coal samples, whereas, the other 20 elements have higher mean values in the 644 bituminous coal samples of this report.

Table 10c.--Arithmetic mean, observed range, geometric mean, and geometric deviation of 38 elements in 49 coal samples from Indiana.

[All data are in parts per million and are reported on a whole-coal basis; L means less than value shown.]

Element	Arithmetic mean	Observed range		Geometric mean	Geometric deviation	Geometric mean 644 samples
		Minimum	Maximum			
Ag	0.08	0.009	0.31	0.06	2.3	0.03
As	19	1.0	95	12	2.8	8.4
B	100	61	160	34	2.2	14
Ba	26	5.2	170	19	2.1	48
Be	2.8	1.3	6.5	2.6	1.4	1.9
Cd	.57	.02	9.0	.20	3.6	.07
Ce	15	2.0	110	11	2.1	16
Co	10	1.4	32	8.2	2.1	6.2
Cr	14	3.1	72	12	1.8	14
Cs	.96	.2	6.2	.64	2.3	.66
Cu	20	4.7	96	16	1.8	15
Eu	.32	.08	1.5	.25	1.9	.33
F	72	13L	290	51	2.2	51
Ga	5.3	1.3	18	4.7	1.6	4.8
Ge	13	1.3	32	11	1.9	1.1
Hf	.52	.2L	2.6	.43	1.7	.61
Hg	.14	.02L	.38	.09	2.7	.12
La	7.9	1.0	55	5.8	2.1	8.8
Li	15	1.4	210	8.3	2.5	15
Lu	.13	.1L	.7	.12	1.5	.15
Mn	25	3.0	146	14	2.8	14
Mo	3.1	.46	16	2.1	2.3	1.5
Nb	1.4	.24	4.2	1.2	1.7	1.4
Nd	8.5	1.8L	22	3.1	3.5	4.2
Ni	32	3.3	98	25	2.1	12
Pb	19	2.4L	62	13	2.5	7.0
Sb	1.8	.3	7.4	1.3	2.3	.73
Sc	3.4	1.0	18	2.9	1.6	3.3
Se	2.9	.7L	5.9	2.5	1.7	2.8
Sm	1.5	.4	8.1	1.2	2.0	1.6
Sr	34	3.9	160	22	2.6	65
Tb	.32	.1L	1.1	.21	2.1	.26
U	2.4	.7	15	1.6	2.2	1.3
V	19	3.3	120	14	2.1	16
Y	4.7	1.5	12	4.2	1.6	6.2
Yb	.78	.3	4.0	.68	1.6	.84
Zn	85	6.5	1600	36	3.0	14
Zr	12	3.2	30	11	1.6	13

Table 10d.--Descriptions for 49 bituminous coal samples from Indiana.

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w194388	Indiana	Sullivan	391235n	871440w	Petersburg	No Data Entered	Channel	62.0
w194389	Indiana	Sullivan	391235n	871439w	Petersburg	No Data Entered	Channel	64.0
w194390	Indiana	Owen	391434n	870136w	Brazil	No Data Entered	Channel	25.0
w194391	Indiana	Spencer	380744n	865526w	Brazil	No Data Entered	Channel	31.0
w194392	Indiana	Spencer	380747n	865526w	Brazil	No Data Entered	Channel	23.0
w194393	Indiana	Dubois	382038n	870129w	Staunton	No Data Entered	Channel	62.0
w194394	Indiana	Dubois	382038n	870130w	Staunton	No Data Entered	Channel	19.0
w194395	Indiana	Gibson	381855n	872210w	Dugger	Hymera	Channel	14.0
w194396	Indiana	Gibson	381855n	872210w	Dugger	Hymera	Channel	30.0
w194397	Indiana	Gibson	381855n	872220w	Dugger	No Data Entered	Channel	45.0
w197291	Indiana	Perry	381120n	864052w	Mansfield	No Data Entered	Channel	21.0
w197292	Indiana	Perry	381117n	864055w	Mansfield	No Data Entered	Channel	25.0
w197293	Indiana	Gibson	381550n	872222w	Dugger	No Data Entered	Channel	31.0
w197294	Indiana	Gibson	381852n	872221w	Dugger	Danville	Channel	47.0
w197295	Indiana	Spencer	380817n	865521w	Mansfield	No Data Entered	Channel	30.0
w197296	Indiana	Martin	385636n	864910w	Mansfield	No Data Entered	Channel	30.0
w197297	Indiana	Daviess	383539n	865953w	Staunton	No Data Entered	Channel	32.0
w194825	Indiana	Greene	390741n	871140w	Dugger	No Data Entered	Channel	5.0
w194856	Indiana	Greene	390741n	871140w	Petersburg	Survant	Channel	61.0
w194857	Indiana	Sullivan	390349n	872023w	Dugger	Hymera No 6	Channel	66.0
w194858	Indiana	Pike	383148n	871341w	Petersburg	Springfield No 5	Channel	78.0
w194859	Indiana	Warrick	380541n	871539w	Petersburg	Springfield No 5	Channel	34.0
w194860	Indiana	Pike	382208n	871754w	Petersburg	Springfield No 5	Channel	50.0
w194861	Indiana	Pike	382148n	871325w	Petersburg	Springfield No 5	Channel	56.0
w194862	Indiana	Warrick	375846n	872151w	Petersburg	Springfield No 5	Channel	43.0
w194863	Indiana	Warrick	380534n	871539w	Petersburg	Springfield No 5	Channel	28.0
w194864	Indiana	Pike	382725n	871437w	Petersburg	Springfield No 5	Channel	64.0
w194865	Indiana	Pike	382639n	871832w	Dugger	Hymera No 6	Channel	31.0
w194866	Indiana	Pike	382637n	871837w	Dugger	Hymera No 6	Channel	36.0
w196338	Indiana	Owen	391436n	870131w	Brazil	Upper Block	Channel	32.0
w196339	Indiana	Vigo	393305n	871638w	Linton	Colchester	Channel	23.0
w196340	Indiana	Vigo	393305n	871638w	Linton	Colchester	Channel	29.0
w196341	Indiana	Vigo	393305n	871638w	Linton	Colchester	Channel	52.0
w196342	Indiana	Dubois	383041n	864625w	Mansfield	Blue Creek	Channel	34.0
w196343	Indiana	Dubois	383043n	864559w	Mansfield	Blue Creek	Channel	31.0

Table 10d.--Descriptions for 49 bituminous coal samples from Indiana--continued

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w196344	Indiana	Vigo	392209n	871628w	Petersburg	Houchin Creek	Channel	34.0
w196345	Indiana	Spencer	380943n	865645w	Brazil	No Data Entered	Channel	14.0
w196346	Indiana	Spencer	380943n	865645w	Brazil	No Data Entered	Channel	11.0
w196347	Indiana	Spencer	380943n	865645w	Brazil	No Data Entered	Channel	26.0
w196348	Indiana	Spencer	380814n	865538w	Brazil	No Data Entered	Channel	14.0
w196349	Indiana	Spencer	380814n	865538w	Brazil	No Data Entered	Channel	10.0
w196350	Indiana	Spencer	380814n	865538w	Brazil	No Data Entered	Channel	25.0
w196351	Indiana	Spencer	380814n	865741w	Brazil	No Data Entered	Channel	8.0
w196352	Indiana	Spencer	380814n	865741w	Brazil	No Data Entered	Channel	1.0
w196353	Indiana	Spencer	380814n	865741w	Brazil	No Data Entered	Channel	2.0
w196354	Indiana	Spencer	380814n	865741w	Brazil	No Data Entered	Channel	18.0
w196355	Indiana	Spencer	380343n	865422w	Mansfield	Mariah Hill	Channel	29.0
w196356	Indiana	Spencer	380343n	865422w	Mansfield	Mariah Hill	Channel	18.0
w196357	Indiana	Spencer	380343n	865422w	Mansfield	Mariah Hill	Channel	11.0

Table 10e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 10 bituminous coal samples from Indiana.

[All analyses except Kcal/kg, Btu, free-swelling index and ash-fusion temperatures in percent. For each sample number, the analyses are reported three ways; first, as-received, second, moisture free, and third, moisture and ash free. All analyses by Coal Analysis Section, Department of Energy, Pittsburgh, Pa. B, not determined. 1600G for ash-fusion temperatures means greater than 1600 C.]

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w194388	4.6	42.8	44.0	8.6	5.1	68.6	1.2	13.3	3.2	6,920	12,460
	---	44.9	46.1	9.0	4.8	71.9	1.3	9.7	3.4	7,250	13,060
	---	49.3	50.7	---	5.3	79.0	1.4	10.6	3.7	7,970	14,350
w194389	5.7	39.9	45.5	8.9	5.6	67.7	1.2	12.9	3.7	6,820	12,280
	---	42.3	48.3	9.4	5.3	71.8	1.3	8.3	3.9	7,230	13,020
	---	46.7	53.3	---	5.8	79.3	1.4	9.2	4.3	7,990	14,370
w194390	4.2	37.4	52.0	6.4	5.4	73.0	1.4	11.8	2.0	7,230	13,010
	---	39.0	54.3	6.7	5.1	76.2	1.5	8.4	2.1	7,540	13,580
	---	41.8	58.2	---	5.5	81.7	1.6	9.0	2.2	8,080	14,550
w194391	3.8	37.6	49.2	9.4	5.1	69.1	1.4	11.9	3.2	6,900	12,430
	---	39.1	51.1	9.8	4.9	71.8	1.5	8.9	3.3	7,180	12,920
	---	43.3	56.7	---	5.4	79.6	1.6	9.8	3.7	7,950	14,320
w194392	3.8	38.8	49.7	7.7	5.2	71.1	1.4	11.8	2.7	7,080	12,740
	---	40.3	51.7	8.0	5.0	73.9	1.5	8.8	2.8	7,360	13,240
	---	43.8	56.2	---	5.4	80.3	1.6	9.5	3.1	8,000	14,390
w194393	2.1	39.0	45.2	13.6	4.8	64.7	1.2	7.9	7.7	6,660	11,980
	---	39.8	46.2	13.9	4.7	66.1	1.2	6.2	7.9	6,800	12,240
	---	46.3	53.6	---	5.4	76.7	1.4	7.2	9.1	7,900	14,210
w194394	2.2	40.1	44.4	13.3	4.9	65.4	1.2	8.8	6.4	6,700	12,060
	---	41.0	45.4	13.6	4.8	66.9	1.2	7.0	6.5	6,850	12,330
	---	47.5	52.5	---	5.5	77.4	1.4	8.1	7.6	7,930	14,270
w194395	2.8	25.0	27.3	44.9	3.5	39.1	.9	9.8	1.9	3,850	6,930
	---	25.7	28.1	46.2	3.3	40.2	.9	7.5	2.0	3,960	7,130
	---	47.8	52.2	---	6.1	74.8	1.7	14.0	3.6	7,360	13,250
w194396	5.1	34.1	45.0	15.8	4.9	61.7	1.4	12.6	3.5	6,160	11,090
	---	35.9	47.4	16.6	4.6	65.0	1.5	8.5	3.7	6,490	11,680
	---	43.1	56.9	---	5.5	78.0	1.8	10.2	4.4	7,790	14,020
w194397	6.2	37.2	43.9	12.7	5.1	62.4	1.4	13.6	4.8	6,280	11,300
	---	39.7	46.8	13.5	4.7	66.5	1.5	8.6	5.1	6,690	12,040
	---	45.9	54.1	---	5.4	76.9	1.7	10.0	5.9	7,740	13,930

Table 10e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 10 bituminous coal samples from Indiana--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
W194388	0.9	0.01	1.40	1.83	5.0	1,340	1,400	1,455
	---	.01	1.47	1.92				
	---	.01	1.61	2.11				
W194389	1.7	.01	1.58	2.11	4.0	1,170	1,230	1,290
	---	.01	1.68	2.24				
	---	.01	1.85	2.47				
W194390	1.5	.01	1.37	.58	1.5	1,180	1,235	1,295
	---	.01	1.43	.61				
	---	.01	1.53	.65				
W194391	.9	.01	2.30	.88	3.5	1,125	1,175	1,235
	---	.01	2.39	.91				
	---	.01	2.65	1.01				
W194392	.9	.02	1.21	1.46	4.0	1,125	1,185	1,245
	---	.02	1.26	1.52				
	---	.02	1.37	1.65				
W194393	.0	.02	6.10	1.59	5.0	1,130	1,180	1,240
	---	.02	6.23	1.62				
	---	.02	7.24	1.89				
W194394	.0	.04	4.88	1.52	5.0	1,180	1,240	1,295
	---	.04	4.99	1.55				
	---	.05	5.78	1.80				
W194395	.6	.02	1.44	.40	.0	1,540	1,540	1,540
	---	.02	1.48	.41				
	---	.04	2.75	.76				
W194396	1.6	.02	2.86	.58	2.0	1,275	1,330	1,390
	---	.02	3.01	.61				
	---	.03	3.62	.73				
W194397	1.4	.55	3.08	1.11	3.0	1,155	1,215	1,270
	---	.59	3.28	1.18				
	---	.68	3.80	1.37				

Table 10f.--Major and minor oxide and trace element compostion of the laboratory ash of 49 bituminous coal samples from Indiana.

[Values in percent or parts-per-million. Coal ashed at 525 C. L means less than the value shown; N, not detected; B, not determined; S after element title indicates determinations by automatic plate reading computer assisted, emission spectographic analyses. The standard deviation of any single answer should be taken as plus 50% and minus 35%. Methods of analyses for other elements as shown in figure 1.]

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w194388	8.8	50	22	0.74	0.65	0.31	2.1	14	1.1	0.04	w194388
w194389	9.0	46	19	.69	.30	.15	1.8	19	1.0	.01	w194389
w194390	8.9	41	20	.72	.40	.15	1.4	24	1.2	.54	w194390
w194391	9.4	38	19	.61	.38	.29	1.1	28	1.1	.40	w194391
w194392	7.9	38	21	.66	.36	.17	1.0	27	1.1	.32	w194392
w194393	13.2	24	9.9	.64	.32	.20	.74	49	.61	.09	w194393
w194394	12.0	31	13	.71	.40	.22	1.2	41	.74	.10	w194394
w194395	41.9	51	29	.42	1.1	.39	3.5	6.6	1.3	.07	w194395
w194396	13.2	40	22	.43	.76	.31	2.3	23	1.0	.10	w194396
w194397	13.1	32	14	4.7	.61	.21	2.0	31	.79	.34	w194397
w197291	3.5	36	28	1.3	.90	.39	1.5	23	.78	.18	w197291
w197292	7.6	44	31	.60	.70	.18	2.2	17	.89	.14	w197292
w197293	18.2	40	22	.49	1.1	.22	2.6	27	.91	.11	w197293
w197294	9.3	38	17	.67	.81	.29	2.3	37	.89	.18	w197294
w197295	9.7	43	19	.40	.50	.14	1.9	31	.89	.05	w197295
w197296	10.0	36	25	.56	.56	.13	1.3	32	.71	.12	w197296
w197297	10.9	20	11	.47	.20	.12	.48	65	.52	.18	w197297
w194825	43.0	35	17	.51	.85	.16	2.4	31	.78	.16	w194825
w194856	16.6	49	28	.61	1.1	.24	3.9	8.2	1.2	.08	w194856
w194857	9.8	44	15	4.8	.76	.55	2.2	14	.93	.05	w194857
w194858	10.0	41	17	.76	.65	.13	2.2	24	.84	.05	w194858
w194859	5.5	53	28	1.1	.80	.25	2.9	6.5	1.3	.41	w194859
w194860	8.1	43	20	1.7	.75	.17	2.4	21	1.1	.03	w194860
w194861	9.0	50	23	.49	.56	.15	2.3	15	1.2	.17	w194861
w194862	10.5	44	17	6.9	.50	.51	1.8	17	1.1	.01	w194862
w194863	12.7	41	20	.66	.60	.21	2.6	24	.96	.04	w194863
w194864	9.7	45	28	4.5	.78	.56	3.3	8.1	1.2	1.2	w194864
w194865	6.2	32	18	.73	.36	.22	1.7	31	.58	.11	w194865
w194866	9.8	55	27	.52	1.2	.28	3.2	4.6	1.3	.24	w194866
w196338	9.8	55	33	.52	.73	.28	2.6	3.2	1.6	.27	w196338
w196339	9.1	35	7.4	11	.48	.15	.86	26	.49	.15	w196339
w196340	13.1	43	13	8.9	.70	.10	1.6	16	.70	.01	w196340
w196341	11.1	42	11	8.1	.65	.12	1.4	20	.66	.07	w196341
w196342	3.2	38	30	1.2	.45	.42L	.51	18	.70	.53	w196342
w196343	4.1	32	17	1.6	.53	.33L	.74	33	.65	.71	w196343
w196344	6.6	26	13	.60	.66	.20	.86	42	.83	.09	w196344
w196345	7.0	31	13	.77	.45	.19	.91	40	.87	.09	w196345
w196346	7.3	37	23	.67	.38	.18	.78	26	1.1	.35	w196346
w196347	7.2	32	15	.61	.38	.19	.89	37	.94	.17	w196347
w196348	5.5	37	15	.72	.45	.25	1.1	31	.92	.05	w196348

Table 10f.--Major and minor oxide and trace element compostion of the laboratory ash of 49 bituminous coal samples from Indiana--continued

Sample number	SO3 (percent)	Ag-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w194388	0.93	0.70	1,000G	150	37	23	150	66	130	9.1	w194388
w194389	1.3	.80	1,000G	190	37	.64	160	81	150	7.8	w194389
w194390	1.0	1.1	1,000G	490	73	13	180	91	79	4.5	w194390
w194391	.73	1.1	1,000G	390	46	2.0	230	260	180	7.4	w194391
w194392	.80	2.0	1,000G	300	62	1.3	290	280	140	7.6	w194392
w194393	1.0	.70	1,000G	71	27	1.5	53	53	86	6.1	w194393
w194394	1.1	.40	1,000G	100	29	.42	58	47	110	8.3	w194394
w194395	.80	.10	270	400	8.0	2.3	270	18	170	15	w194395
w194396	1.0	.50	1,000G	240	23	.74	270	77	190	12	w194396
w194397	1.9	.40	1,000G	290	15	.71	99	31	73	6.9	w194397
w197291	2.5	2.5	2,000	150	56	4.9	230	340	250	8.6	w197291
w197292	.98	1.3	1,500	140	29	1.6	260	180	220	12	w197292
w197293	1.8	.30	650	200	17	1.9	200	61	140	10	w197293
w197294	1.9	.50	1,000G	210	24	.76	86	72	130	8.6	w197294
w197295	.79	.80	1,000G	130	37	2.4	130	160	100	8.2	w197295
w197296	1.4	1.2	1,500	71	18	11	70	100	150	7.0	w197296
w197297	1.1	.90	1,500	120	52	.49	160	37	81	2.8	w197297
w194825	2.1	.30	150	220	3.0	.43	98	23	120	7.2	w194825
w194856	1.1	.30	740	390	17	.96	190	27	190	13	w194856
w194857	3.3	.20	1,000G	210	17	.44	51	29	110	8.2	w194857
w194858	1.4	.40	610	180	16	16	120	30	110	8.0	w194858
w194859	.85	.40	1,000G	520	57	2.8	270	56	180	11	w194859
w194860	2.3	.40	1,000G	520	33	3.6	140	48	130	12	w194860
w194861	1.0	.70	1,000G	290	25	100	89	140	130	10	w194861
w194862	5.2	.10	1,000G	250	26	.57	76	21	110	8.6	w194862
w194863	1.3	1.0	540	260	20	1.9	110	31	240	9.4	w194863
w194864	1.8	.60	1,000G	650	31	.60	260	37	140	14	w194864
w194865	1.2	.50	1,000G	170	42	1.5	97	210	73	6.5	w194865
w194866	.67	.70	910	510	37	1.6	200	98	160	14	w194866
w196338	.46	.30	1,000G	490	24	1.0	220	93	200	13	w196338
w196339	5.6	.10	1,000G	140	15	4.9	44	15	90	4.4	w196339
w196340	.60	.10	1,000G	230	15	3.3	46	43	85	7.6	w196340
w196341	4.4	.10	1,000G	200	18	2.2	45	32	110	7.2	w196341
w196342	1.5	1.1	1,000G	490	73	4.3	310	670	210	22L	w196342
w196343	1.7	3.3	1,000G	310	40	5.6	240	440	120	17L	w196343
w196344	2.0	.20	1,000G	220	40	12	91	79	130	20	w196344
w196345	1.3	.70	1,000G	160	40	1.2	86	97	100	7.1	w196345
w196346	1.0	2.8	1,000G	270	33	.28	300	390	210	4.1	w196346
w196347	1.0	1.3	1,000G	180	32	.87	140	180	170	5.6	w196347
w196348	1.2	1.3	1,000G	190	40	.75	73	93	110	7.3	w196348

Table 10f.--Major and minor oxide and trace element compostion of the laboratory ash of 49 bituminous coal samples from Indiana--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Ho-S (ppm)	La (ppm)	Sample number
w194388	130	32L	10L	3.4	41	7.0L	130	5.7	10L	68	w194388
w194389	160	32L	11	3.1	41	24	130	5.6	7.0L	67	w194389
w194390	200	32L	10L	3.9	120	30	360	4.5	7.0L	100	w194390
w194391	280	32L	10L	5.0	78	10L	210	7.4	7.0L	130	w194391
w194392	320	32L	15	5.4	99	31	330	5.1	7.0L	160	w194392
w194393	100	32L	14	1.6	47	7.0L	130	3.0	7.0L	23	w194393
w194394	92	32L	10L	2.2	51	10L	210	3.3	7.0L	33	w194394
w194395	230	32L	10L	3.6	44	7.0L	6.0	6.2	7.0L	130	w194395
w194396	270	32L	10L	6.4	53	17	110	6.1	7.0L	130	w194396
w194397	85	32L	10L	1.7	49	7.0L	93	3.8	7.0L	61	w194397
w197291	420	32L	10L	6.9	140	13	610	5.7	7.0L	110	w197291
w197292	320	32L	10L	6.3	75	10	140	5.3	7.0L	130	w197292
w197293	260	32L	10L	4.5	44	15	81	4.9	7.0L	100	w197293
w197294	120	32L	10L	1.8	39	7.0L	74	5.4	7.0L	43	w197294
w197295	200	32L	10L	4.0	53	14	160	5.2	7.0L	62	w197295
w197296	140	32L	10L	1.2	49	7.0L	94	4.0	7.0L	40	w197296
w197297	100	32L	10L	3.7	69	24	160	2.8	7.0L	73	w197297
w194825	180	22L	10L	2.2	32	16	3.0	3.7	7.0L	49	w194825
w194856	300	32L	10L	3.0	59	9.0	28	6.6	7.0L	96	w194856
w194857	69	32L	10L	1.2	46	7.0L	73	4.1	7.0L	31	w194857
w194858	110	32L	10L	2.3	35	7.0L	64	5.0	7.0L	60	w194858
w194859	160	32L	12	6.4	68	20	220	7.3	7.0L	150	w194859
w194860	85	32L	10L	2.7	37	7.0L	66	4.9	7.0L	74	w194860
w194861	230	32L	10L	1.8	48	7.0L	120	6.7	7.0L	56	w194861
w194862	45	32L	10L	1.3	33	20	70	5.7	7.0L	48	w194862
w194863	120	32L	10L	1.8	39	7.0L	100	6.3	7.0L	47	w194863
w194864	240	32L	10L	6.8	52	34	85	5.2	7.0L	130	w194864
w194865	78	32L	11	2.9	44	7.0L	210	3.2	7.0L	48	w194865
w194866	160	32L	10L	4.6	58	11	160	6.1	7.0L	110	w194866
w196338	250	22L	10L	5.3	51	14	130	7.1	7.0L	130	w196338
w196339	94	22L	10L	.99	14	15	62	6.6	7.0L	22	w196339
w196340	130	22L	10L	.61	19	7.0L	25	3.1	7.0L	23	w196340
w196341	120	22L	10L	.99	17	15	38	3.6	7.0L	27	w196341
w196342	350	29	10L	8.8	83	35	410	16L	15L	220	w196342
w196343	290	22L	11	7.8	93	22	460	9.8	7.0L	150	w196343
w196344	150	24	10L	2.1	56	18	240	6.1	7.0L	61	w196344
w196345	250	22L	14	2.3	63	7.0L	260	4.3	7.0L	43	w196345
w196346	350	22L	10L	5.8	58	15	250	5.5	7.0L	180	w196346
w196347	290	22L	10L	3.3	64	7.0L	250	5.6	7.0L	83	w196347
w196348	260	22L	12	2.4	59	7.0L	320	3.6	7.0L	36	w196348

Table 10f.--Major and minor oxide and trace element compostion of the laboratory ash of 49 bituminous coal samples from Indiana--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Sample number
w194388	73	1	180	140	14	61	240	44	68L	100	w194388
w194389	160	2	78	180	21	150	290	110	68L	180	w194389
w194390	82	1	100	13	22	230	760	130	68L	240L	w194390
w194391	140	2	80	20	15	110	460	400	68L	280L	w194391
w194392	140	1	86	30	20	180	650	360	68L	290L	w194392
w194393	39	.8	320	31	15	46L	220	84	68L	140	w194393
w194394	48	.8	390	33	21	46L	300	220	68L	200L	w194394
w194395	500	2	270	8.0	10	52	72	70	68L	220	w194395
w194396	280	2	240	25	15	68	260	300	68L	130	w194396
w194397	92	.8	240	30	14	46L	80	96	68L	110	w194397
w197291	120	3	200	22	7	56	620	280	68L	490L	w197291
w197292	190	3	110	11	8	70	280	190	68L	290L	w197292
w197293	270	2	470	18	9	84	190	230	68L	160	w197293
w197294	87	1	210	31	21	46L	170	170	68L	190	w197294
w197295	81	1	79	14	11	46L	220	290	68L	150	w197295
w197296	170	1	110	15	7	46L	230	79	68L	230L	w197296
w197297	52	.9	180	12	13	68	160	330	68L	240L	w197297
w194825	110	.7	110	17	3	46L	82	140	68L	140	w194825
w194856	190	1	100	24	12	110	110	73	68L	230	w194856
w194857	40	1	470	6.0	10	46L	68	80	68L	260L	w194857
w194858	40	1	160	53	11	66	100	30	68L	160	w194858
w194859	70	2	150	40	16	190	180	71	68L	220	w194859
w194860	47	1	260	21	16	60	110	38	68L	190	w194860
w194861	60	1	180	94	15	46L	380	130	68L	200	w194861
w194862	110	1	540	47	20	46L	78	23	68L	110	w194862
w194863	100	.8	120	97	15	53	120	64	68L	130	w194863
w194864	120	1	210	29	18	160	120	60	68L	220	w194864
w194865	41	2	140	33	28	46L	450	530	68L	310L	w194865
w194866	140	1	100	24	17	170	240	140	68L	170	w194866
w196338	200	1	79	10	14	100	300	170	68L	520L	w196338
w196339	32	1	1,600	16	4	46L	36	10L	68L	350L	w196339
w196340	71	.8	860	7.0	9	46L	67	25	68L	280L	w196340
w196341	64	.9	950	15	12	46L	69	29	68L	350L	w196341
w196342	120	3L	140	19	22	220	1,600	280	120	910L	w196342
w196343	79	2L	270	17	9	120	670	270	93	710L	w196343
w196344	60	2	420	36	17	70	630	150	68L	480L	w196344
w196345	91	1	160	38	32	49	640	230	68L	510L	w196345
w196346	200	1	64	17	11	100	800	510	80	590L	w196346
w196347	130	1	160	16	14	57	420	320	68L	540L	w196347
w196348	97	2	130	27	25	46L	650	240	68L	510L	w196348

Table 10f.--Major and minor oxide and trace element compostion of the laboratory ash of 49 bituminous coal samples from Indiana--continued

Sample number	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Sample number
w194388	27	16	7.0L	140	2.3	34L	10L	65	250	40	w194388
w194389	26	B	7.0L	180	5.6L	33L	10L	72	340	94	w194389
w194390	27	17	7.0L	1,500	2.2	34L	10L	21	180	N	w194390
w194391	38	23	7.0L	770	3.2	32L	10L	15	160	N	w194391
w194392	37	28	7.0L	720	7.6	38L	10L	13	240	N	w194392
w194393	14	6.8	7.0L	40	1.5	23L	10L	21	89	N	w194393
w194394	17	9.2	7.0L	44	2.5	25L	10L	10	110	N	w194394
w194395	43	19	7.0L	190	2.6	41	10L	18	200	28	w194395
w194396	48	32	7.0L	170	3.8	23L	10L	54	270	49	w194396
w194397	20	9.9	7.0L	470	3.8L	23L	59	11	84	28	w194397
w197291	69	31	12	250	5.7	86L	18	40	180	48	w197291
w197292	66	30	7.0L	210	3.9	39L	10L	34	190	27	w197292
w197293	38	21	7.0L	130	3.8	27	10L	32	200	43	w197293
w197294	27	8.6	7.0L	250	1.1	32L	10L	14	130	38	w197294
w197295	30	20	7.0L	40	3.1	31L	10L	19	140	27	w197295
w197296	40	6.0	7.0	42	1.0	30L	10L	11	120	15	w197296
w197297	38	16	10	460	2.8	28L	10L	10	74	53	w197297
w194825	21	11	2.0	160	1.9	7.0L	3.0L	26	150	18	w194825
w194856	18	15	10	250	2.4	18L	10L	28	230	45	w194856
w194857	24	5.1	7.0L	140	4.1L	31L	10L	7.1	98	19	w194857
w194858	22	12	7.0L	160	2.0	60	10L	36	310	38	w194858
w194859	47	29	9.0	1,100	3.6	55L	15L	25	260	85	w194859
w194860	26	14	7.0L	130	2.5	37L	10L	17	140	57	w194860
w194861	31	8.9	7.0L	110	2.2	33L	10L	20	160	44	w194861
w194862	20	6.7	7.0L	160	.95	29L	10L	6.7	140	45	w194862
w194863	31	11	7.0L	130	1.6	39	10L	120	930	25	w194863
w194864	38	28	7.0L	1,700	4.1	31L	10L	22	220	100	w194864
w194865	40	9.7	7.0L	180	6.5L	48L	10L	18	130	58	w194865
w194866	37	22	7.0L	800	2.0	31L	10L	20	210	63	w194866
w196338	45	23	5.0	1,200	3.1	31L	3.0L	20	200	51	w196338
w196339	11	4.4	2.0L	190	5.5	33L	3.0L	20	42	28	w196339
w196340	18	3.1	2.0L	190	4.6L	23L	3.0L	6.9	87	19	w196340
w196341	16	3.6	2.0L	230	4.5L	27L	3.0L	11	100	29	w196341
w196342	47	44	2.0L	2,500	9.4	94L	3.0L	25	150	110	w196342
w196343	41	39	2.0L	1,100	4.9	73L	3.0L	17	81	81	w196343
w196344	52	9.1	2.0L	220	9.1L	45L	3.0L	18	140	80	w196344
w196345	33	10	2.0L	250	2.9	43L	3.0L	11	150	110	w196345
w196346	56	33	2.0L	650	5.5	41L	3.0L	12	160	58	w196346
w196347	40	15	2.0L	390	9.7L	42L	3.0L	11	130	62	w196347
w196348	35	9.1	2.0L	180	5.5	55L	3.0L	13	150	110	w196348

Table 10f.--Major and minor oxide and trace element compostion of the laboratory ash of 49 bituminous coal samples from Indiana--continued

Sample number	Yb (ppm)	Zn (ppm)	Zr-S (ppm)
w194388	8.0	1,800	71
w194389	7.8	190	220
w194390	4.5	1,300	160
w194391	11	560	100
w194392	8.9	350	150
w194393	4.5	66	79
w194394	5.0	60	120
w194395	9.5	290	72
w194396	14	130	75
w194397	4.6	70	99
w197291	11	1,200	91
w197292	12	380	62
w197293	10	220	55
w197294	5.4	100	190
w197295	8.2	490	50
w197296	4.0	660	55
w197297	6.4	85	130
w194825	3.7	64	39
w194856	7.8	410	100
w194857	4.1	83	64
w194858	6.0	2,300	87
w194859	11	410	150
w194860	7.4	520	130
w194861	6.7	3,300	130
w194862	4.8	62	200
w194863	4.7	310	130
w194864	8.2	120	200
w194865	4.8	510	230
w194866	7.1	510	150
w196338	8.2	370	130
w196339	3.3	200	69
w196340	3.1	210	150
w196341	3.6	160	160
w196342	9.4	1,400	270
w196343	9.8	1,600	150
w196344	12	450	200
w196345	11	420	270
w196346	12	110	120
w196347	11	260	130
w196348	13	330	240

Table 10f.--Major and minor oxide and trace element compostion of the laboratory ash of 49 bituminous coal samples from Indiana--continued

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w196349	7.7	40	24	0.52	0.36	0.18	0.98	21	1.2	0.26	w196349
w196350	6.5	40	20	.61	.38	.21	1.1	26	1.1	.16	w196350
w196351	6.2	14	6.3	.73	.35	.22	.33	60	.51	.01	w196351
w196352	6.5	39	17	.71	.51	.21	1.5	29	1.2	.04	w196352
w196353	8.2	26	16	.48	.27	.16	.79	41	.82	.14	w196353
w196354	6.8	27	13	.62	.36	.20	.87	43	.86	.07	w196354
w196355	3.0	47	27	.84	.40	.45L	.74	13	1.2	.04	w196355
w196356	2.9	47	18	.91	.43	.46L	.84	20	1.2	.05	w196356
w196357	3.3	47	33	.80	.40	.41L	.66	6.3	1.2	.05	w196357

Table 10f.--Major and minor oxide and trace element compostion of the laboratory ash of 49 bituminous coal samples from Indiana--continued

Sample number	SO3 (percent)	Ag-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Sample number
w196349	0.87	2.8	1,000G	280	35	2.2	190	380	220	3.9	w196349
w196350	1.0	2.2	1,000G	250	35	1.9	110	270	180	6.2	w196350
w196351	1.8	1.1	1,000G	100	51	4.9	32	160	50	11L	w196351
w196352	1.1	.50	1,000G	170	30	.73	92	110	110	14	w196352
w196353	3.3	3.8	1,000G	170	28	43	160	380	230	4.9	w196353
w196354	1.9	3.3	1,000G	160	35	18	100	220	150	5.9	w196354
w196355	1.2	2.2	1,000G	210	130	5.7	130	410	240	6.7	w196355
w196356	1.5	3.1	1,000G	180	110	1.7	100	230	170	6.9	w196356
w196357	1.0	.80	1,000G	250	100	13	150	570	310	18L	w196357

Table 10f.--Major and minor oxide and trace element compostion of the laboratory ash of 49 bituminous coal samples from Indiana--continued

Sample number	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Ho-S (ppm)	La (ppm)	Sample number
w196349	370	22L	10L	3.4	50	7.0L	180	5.2	7.0L	100	w196349
w196350	320	22L	10L	3.4	64	16	240	3.1	7.0L	62	w196350
w196351	150	22L	10L	1.6	110	7.0L	N	8.1L	7.0L	16	w196351
w196352	320	22L	10L	1.4	71	7.0L	260	4.6	7.0L	46	w196352
w196353	300	22L	10L	2.7	63	7.0L	N	3.7	7.0L	85	w196353
w196354	260	22L	10L	2.5	99	7.0L	430	4.4	7.0L	59	w196354
w196355	420	34	18	5.3	91	21	240	10	9.0	67	w196355
w196356	280	36	16	5.9	60	29	160	6.9	12	69	w196356
w196357	570	33	16	4.5	110	22	270	9.1	8.0	91	w196357

Table 10f.--Major and minor oxide and trace element compostion of the laboratory ash of 49 bituminous coal samples from Indiana--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Sample number
w196349	230	1	51	25	8	63	980	570	68L	490L	w196349
w196350	160	2	88	22	11	52	770	350	68L	480L	w196350
w196351	22	2	150	71	21	46L	730	550	68L	500L	w196351
w196352	94	2	100	16	11	46L	250	170	68L	460L	w196352
w196353	110	1	66	47	20	68	1,200	750	68L	490L	w196353
w196354	77	1	95	35	18	46L	770	590	68L	470L	w196354
w196355	110	3	100	19	21	64	2,100	230	68L	830L	w196355
w196356	54	3	110	26	23	62	1,200	220	68L	760L	w196356
w196357	160	3	97	14	25	63	2,900	260	68L	700L	w196357

Table 10f.--Major and minor oxide and trace element compostion of the laboratory ash of 49 bituminous coal samples from Indiana--continued

Sample number	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Sample number
w196349	58	19	2.0L	560	3.9	39L	13	14	200	44	w196349
w196350	49	14	2.0L	420	3.1	46L	3.0L	14	160	60	w196350
w196351	42	6.5	N	140	11L	48L	3.0L	15	110	73	w196351
w196352	32	9.2	2.0L	140	4.6	46L	3.0L	14	98	53	w196352
w196353	49	15	2.0L	340	3.7	37L	3.0L	15	200	42	w196353
w196354	44	10	2.0L	240	10L	44L	3.0L	13	140	53	w196354
w196355	77	20	2.0L	200	10	100L	3.0L	30	210	150	w196355
w196356	34	21	2.0L	200	6.9	100L	3.0L	28	140	170	w196356
w196357	110	18	4.0	210	12	91L	3.0L	36	410	160	w196357

Table 10f.--Major and minor oxide and trace element compostion of the laboratory ash of 49 bituminous coal samples from Indiana--continued

Sample number	Yb (ppm)	Zn (ppm)	Zr-S (ppm)
w196349	13	1,400	77
w196350	11	1,100	100
w196351	9.7	1,900	270
w196352	12	300	95
w196353	7.3	20,000	190
w196354	8.8	2,500	130
w196355	23	990	190
w196356	24	410	220
w196357	21	2,400	410

Table 10g.--Content of 22 trace elements in 49 bituminous coal samples from Indiana.

[Analysis performed on whole-coal. Values in parts-per-million (ppm). L, less than the value shown; B, not determined.]

Sample number	As (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	La (ppm)	Sample number
w194388	4.0	13	5.8	11	0.8	0.30	170	0.5	0.040	6	w194388
w194389	5.0	14	7.3	13	.7	.28	20L	.5	.020	6	w194389
w194390	6.0	16	8.1	7.0	.4	.35	76	.4	.010L	9	w194390
w194391	29	22	25	17	.7	.47	20L	.7	.020	12	w194391
w194392	25	23	22	11	.6	.43	20L	.4	.020	13	w194392
w194393	16	7.0	7.0	11	.8	.21	20L	.4	.050	3	w194393
w194394	20	7.0	5.6	13	1.0	.26	32	.4	.10	4	w194394
w194395	22	110	7.4	72	6.2	1.5	180	2.6	.040	55	w194395
w194396	36	35	10	25	1.6	.85	57	.8	.060	17	w194396
w194397	31	13	4.1	9.5	.9	.22	22	.5	.10	8	w194397
w197291	11	8.0	12	8.6	.3	.24	28	.2	.22	4	w197291
w197292	18	20	13	17	.9	.48	48	.4	.38	10	w197292
w197293	36	37	11	25	1.9	.81	100	.9	.32	19	w197293
w197294	17	8.0	6.7	12	.8	.17	28	.5	.27	4	w197294
w197295	42	13	16	9.9	.8	.39	40	.5	.050	6	w197295
w197296	8.0	7.0	10	15	.7	.12	59	.4	.21	4	w197296
w197297	14	17	4.0	8.8	.3	.40	42	.3	.24	8	w197297
w194825	50	42	9.8	50	3.1	.96	290	1.6	.28	21	w194825
w194856	10	31	4.5	31	2.1	.50	110	1.1	.18	16	w194856
w194857	8.0	5.0	2.8	11	.8	.12	40	.4	.28	3	w194857
w194858	8.0	12	3.0	11	.8	.23	64	.5	.20	6	w194858
w194859	6.0	15	3.1	10	.6	.35	36	.4	.17	8	w194859
w194860	2.0	11	3.9	10	1.0	.22	39	.4	.24	6	w194860
w194861	9.0	8.0	12	12	.9	.16	32	.6	.20	5	w194861
w194862	7.0	8.0	2.2	11	.9	.14	39	.6	.26	5	w194862
w194863	3.0	14	4.0	30	1.2	.23	50	.8	.24	6	w194863
w194864	37	25	3.6	14	1.4	.66	88	.5	.28	13	w194864
w194865	19	6.0	13	4.5	.4	.18	50	.2	.30	3	w194865
w194866	3.0	20	9.6	16	1.4	.45	76	.6	.10	11	w194866
w196338	1.0	22	9.1	20	1.3	.52	140	.7	.010L	13	w196338
w196339	5.0	4.0	1.4	8.2	.4	.09	32	.6	.060	2	w196339
w196340	4.0	6.0	5.6	11	1.0	.08	180	.4	.090	3	w196340
w196341	4.0	5.0	3.5	12	.8	.11	120	.4	.020	3	w196341
w196342	2.0	10	22	6.6	.7L	.28	56	.5L	.060	7	w196342
w196343	10	10	18	4.8	.7L	.32	42	.4	.10	6	w196343
w196344	4.0	6.0	5.2	8.6	1.3	.14	120	.4	.020	4	w196344
w196345	41	6.0	6.8	7.2	.5	.16	68	.3	.14	3	w196345
w196346	17	22	29	15	.3	.42	88	.4	.050	13	w196346
w196347	28	10	13	12	.4	.24	72	.4	.060	6	w196347
w196348	16	4.0	5.1	6.2	.4	.13	64	.2	.080	2	w196348

Table 10g.--Content of 22 trace elements in 49 bituminous coal samples from Indiana--continued

Sample number	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Th (ppm)	Sample number
w194388	0.1	200	15	9	0.50	2.4	1.5	1.4	0.2	3.0L	w194388
w194389	.2	100	4	16	.50	2.3	1.7	B	.5L	3.0L	w194389
w194390	.1	99	210	21L	.70	2.4	2.1	1.5	.2	3.0L	w194390
w194391	.2	200	160	26L	2.5	3.6	5.1	2.2	.3	3.0L	w194391
w194392	.1	100	110	23L	3.0	2.9	4.8	2.2	.6	3.0L	w194392
w194393	.1	200	52	19	.40	1.8	3.6	.90	.2	3.0L	w194393
w194394	.1	200	52	24L	.30	2.0	3.1	1.1	.3	3.0L	w194394
w194395	.7	1,200	130	93	2.5	18	4.1	8.1	1	17	w194395
w194396	.3	300	58	17	4.0	6.3	2.8	4.2	.5	3.0L	w194396
w194397	.1	200	190	14	.60	2.6	1.9	1.3	.5L	3.0L	w194397
w197291	.1	100	28	17L	2.2	2.4	2.1	1.1	.2	3.0L	w197291
w197292	.2	100	46	22L	1.6	5.0	3.7	2.3	.3	3.0L	w197292
w197293	.3	300	87	30	3.8	6.9	2.4	3.9	.7	5.0	w197293
w197294	.1	200	73	18	.90	2.5	1.3	.80	.1	3.0L	w197294
w197295	.1	100	21	15	2.3	2.9	4.9	1.9	.3	3.0L	w197295
w197296	.1	96	52	23L	2.0	4.0	2.1	.60	.1	3.0L	w197296
w197297	.1	97	86	26L	.80	4.1	4.4	1.7	.3	3.0L	w197297
w194825	.3	510	300	61	2.2	9.0	3.7	4.6	.8	3.0L	w194825
w194856	.2	300	58	38	1.8	3.0	1.5	2.5	.4	3.0L	w194856
w194857	.1	400	21	25L	.30	2.4	1.2	.50	.4L	3.0L	w194857
w194858	.1	96	22	16	1.1	2.2	2.5	1.2	.2	6.0	w194858
w194859	.1	100	99	12	.90	2.6	1.1	1.6	.2	3.0L	w194859
w194860	.1	100	11	15	.30	2.1	1.5	1.1	.2	3.0L	w194860
w194861	.1	100	67	18	.70	2.8	3.2	.80	.2	3.0L	w194861
w194862	.1	400	5	12	.90	2.1	2.0	.70	.1	3.0L	w194862
w194863	.1	200	22	17	1.1	4.0	5.2	1.4	.2	5.0	w194863
w194864	.1	400	510	21	1.0	3.7	2.4	2.7	.4	3.0L	w194864
w194865	.1	100	30	19L	.70	2.5	1.5	.60	.4L	3.0L	w194865
w194866	.1	200	100	17	4.6	3.6	.7	2.2	.2	3.0L	w194866
w196338	.1	200	120	51L	1.3	4.4	3.4	2.3	.3	3.0L	w196338
w196339	.1	100	60	32L	1.3	1.0	2.7	.40	.5	3.0L	w196339
w196340	.1	97	6	37L	.60	2.3	1.6	.40	.6L	3.0L	w196340
w196341	.1	99	34	39L	.70	1.7	2.0	.40	.5L	3.0L	w196341
w196342	.1L	100L	74	29L	1.6	1.5	2.0L	1.4	.3	3.0L	w196342
w196343	.1L	100L	130	29L	2.6	1.7	1.4	1.6	.2	3.0L	w196343
w196344	.1	98	26	32L	1.0	3.4	1.5	.60	.6L	3.0L	w196344
w196345	.1	99	28	36L	1.4	2.3	3.1	.70	.2	3.0L	w196345
w196346	.1	97	110	43L	3.8	4.1	4.7	2.4	.4	3.0L	w196346
w196347	.1	100	53	39L	2.0	2.9	4.2	1.1	.7L	3.0L	w196347
w196348	.1	100	12	28L	1.9	1.9	3.1	.50	.3	3.0L	w196348

Table 10g.--Content of 22 trace elements in 49 bituminous coal samples from Indiana--continued

Sample number	U (ppm)	Yb (ppm)
w194388	5.7	0.7
w194389	6.5	.7
w194390	1.9	.4
w194391	1.4	1.0
w194392	1.0	.7
w194393	2.8	.6
w194394	1.2	.6
w194395	7.6	4.0
w194396	7.1	1.9
w194397	1.4	.6
w197291	1.4	.4
w197292	2.6	.9
w197293	5.9	1.9
w197294	1.3	.5
w197295	1.8	.8
w197296	1.1	.4
w197297	1.1	.7
w194825	11	1.6
w194856	4.6	1.3
w194857	.70	.4
w194858	3.6	.6
w194859	1.4	.6
w194860	1.4	.6
w194861	1.8	.6
w194862	.70	.5
w194863	15	.6
w194864	2.1	.8
w194865	1.1	.3
w194866	2.0	.7
w196338	2.0	.8
w196339	1.8	.3
w196340	.90	.4
w196341	1.2	.4
w196342	.80	.3
w196343	.70	.4
w196344	1.2	.8
w196345	.80	.8
w196346	.90	.9
w196347	.80	.8
w196348	.70	.7

Table 10g.--Content of 22 trace elements in 49 bituminous coal samples from Indiana--continued

Sample number	As (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	La (ppm)	Sample number
w196349	14	15	29	17	0.3	0.26	60	0.4	0.13	8	w196349
w196350	16	7.0	18	12	.4	.22	13	.2	.030	4	w196350
w196351	52	2.0	9.7	3.1	.7L	.10	66	.5L	.14	1	w196351
w196352	31	6.0	7.1	7.0	.9	.09	68	.3	.060	3	w196352
w196353	95	13	32	19	.4	.22	34	.3	.30	7	w196353
w196354	53	7.0	15	10	.4	.17	26	.3	.11	4	w196354
w196355	4.0	4.0	12	7.2	.2	.16	76	.3	.060	2	w196355
w196356	5.0	3.0	6.6	5.0	.2	.17	35	.2	.030	2	w196356
w196357	3.0	5.0	19	10	.6L	.15	80	.3	.010L	3	w196357

Table 10g.--Content of 22 trace elements in 49 bituminous coal samples from Indiana--continued

Sample number	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	Th (ppm)	Sample number
w196349	0.1	100	87	38L	4.0	4.5	5.5	1.5	0.3	3.0L	w196349
w196350	.1	100	45	31L	3.0	3.2	3.1	.90	.2	3.0L	w196350
w196351	.1	100	3	31L	2.3	2.6	4.0	.40	.7L	3.0L	w196351
w196352	.1	100	11	30L	3.2	2.1	2.0	.60	.3	3.0L	w196352
w196353	.1	97	50	40L	7.4	4.0	5.9	1.2	.3	3.0L	w196353
w196354	.1	100	21	32L	4.4	3.0	3.5	.70	.7L	3.0L	w196354
w196355	.1	100L	5	25L	.50	2.3	3.6	.60	.3	3.0L	w196355
w196356	.1	99L	6	22L	.30	1.0	4.1	.60	.2	3.0L	w196356
w196357	.1	100L	7	23L	1.3	3.6	1.9	.60	.4	3.0L	w196357

Table 10g.--Content of 22 trace elements in 49 bituminous coal samples from Indiana--continued

Sample number	U (ppm)	Yb (ppm)
w196349	1.1	1.0
w196350	.90	.7
w196351	.90	.6
w196352	.90	.8
w196353	1.2	.6
w196354	.90	.6
w196355	.90	.7
w196356	.80	.7
w196357	1.2	.7

Table 10h.--Major, minor, and trace element composition of 49 bituminous coal samples from Indiana reported on whole-coal basis.

[Values in percent or parts-per-million. 22 values are from direct determinations on whole-coal; all other values calculated from analyses of ash. S means analysis by emission spectography; L, less than the value shown; N, not detected; B, not determined.]

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w194388	2.1	1.0	0.047	0.034	0.020	0.15	0.86	0.058	0.06	4.0	w194388
w194389	1.9	.90	.044	.016	.010	.13	1.2	.054	.07	5.0	w194389
w194390	1.7	.94	.046	.021	.010	.10	1.5	.064	.10	6.0	w194390
w194391	1.7	.94	.041	.022	.020	.086	1.8	.062	.10	29	w194391
w194392	1.4	.88	.037	.017	.010	.066	1.5	.052	.16	25	w194392
w194393	1.5	.69	.060	.025	.020	.081	4.5	.048	.09	16	w194393
w194394	1.7	.83	.061	.029	.020	.12	3.4	.053	.05	20	w194394
w194395	10	6.4	.13	.27	.12	1.2	1.9	.33	.04	22	w194395
w194396	2.5	1.5	.041	.060	.030	.25	2.1	.079	.07	36	w194396
w194397	2.0	.97	.44	.048	.020	.22	2.8	.062	.05	31	w194397
w197291	.59	.52	.032	.019	.010	.044	.56	.016	.09	11	w197291
w197292	1.6	1.2	.033	.032	.010	.14	.90	.041	.10	18	w197292
w197293	3.4	2.1	.064	.12	.030	.39	3.4	.099	.05	36	w197293
w197294	1.7	.84	.044	.045	.020	.18	2.4	.050	.05	17	w197294
w197295	1.9	.97	.028	.029	.010	.15	2.1	.052	.08	42	w197295
w197296	1.7	1.3	.040	.034	.010	.11	2.2	.043	.12	8.0	w197296
w197297	1.0	.63	.037	.013	.010	.044	5.0	.034	.10	14	w197297
w194825	7.0	3.9	.16	.22	.051	.86	9.3	.20	.13	50	w194825
w194856	3.8	2.5	.072	.11	.030	.54	.95	.12	.05	10	w194856
w194857	2.0	.78	.34	.045	.040	.18	.96	.055	.02	8.0	w194857
w194858	1.9	.90	.054	.039	.010	.18	1.7	.050	.04	8.0	w194858
w194859	1.4	.81	.043	.026	.010	.13	.25	.043	.02	6.0	w194859
w194860	1.6	.86	.098	.037	.010	.16	1.2	.053	.03	2.0	w194860
w194861	2.1	1.1	.031	.030	.010	.17	.94	.065	.06	9.0	w194861
w194862	2.2	.94	.52	.032	.040	.16	1.2	.069	.01	7.0	w194862
w194863	2.4	1.3	.060	.046	.020	.28	2.1	.073	.13	3.0	w194863
w194864	2.0	1.4	.31	.046	.040	.27	.55	.070	.06	37	w194864
w194865	.93	.59	.032	.013	.010	.088	1.3	.022	.03	19	w194865
w194866	2.5	1.4	.036	.068	.020	.26	.32	.076	.07	3.0	w194866
w196338	2.5	1.7	.036	.043	.020	.21	.22	.094	.03	1.0	w196338
w196339	1.5	.36	.71	.026	.010	.065	1.7	.027	.01	5.0	w196339
w196340	2.6	.90	.83	.055	.010	.17	1.5	.055	.01	4.0	w196340
w196341	2.2	.65	.64	.043	.010	.13	1.6	.044	.01	4.0	w196341
w196342	.57	.51	.027	.009	.010L	.014	.40	.013	.04	2.0	w196342
w196343	.61	.37	.047	.013	.010L	.025	.95	.016	.14	10	w196343
w196344	.80	.45	.028	.026	.010	.047	1.9	.033	.01	4.0	w196344
w196345	1.0	.48	.038	.019	.010	.053	2.0	.036	.05	41	w196345
w196346	1.3	.89	.035	.017	.010	.047	1.3	.048	.20	17	w196346
w196347	1.1	.57	.031	.016	.010	.053	1.9	.041	.09	28	w196347
w196348	.95	.44	.028	.015	.010	.050	1.2	.030	.07	16	w196348

Table 10h.--Major, minor, and trace element composition of 49 bituminous coal samples from Indiana reported on whole-coal basis--continued

Sample number	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Dy-S (ppm)	Sample number
w194388	88G	13	3.3	2.0	13	5.8	11	0.8	11	2.8L	w194388
w194389	90G	17	3.3	.06	14	7.3	13	.7	14	2.9L	w194389
w194390	89G	44	6.5	1.2	16	8.1	7.0	.4	18	2.8L	w194390
w194391	94G	37	4.3	.19	22	25	17	.7	26	3.0L	w194391
w194392	79G	24	4.9	.10	23	22	11	.6	25	2.5L	w194392
w194393	130G	9	3.6	.20	7.0	7.0	11	.8	13	4.2L	w194393
w194394	120G	12	3.5	.05	7.0	5.6	13	1.0	11	3.8L	w194394
w194395	110	170	3.4	.96	110	7.4	72	6.2	96	13L	w194395
w194396	130G	32	3.0	.10	35	10	25	1.6	36	4.2L	w194396
w194397	130G	38	2.0	.09	13	4.1	9.5	.9	11	4.2L	w194397
w197291	70	5	2.0	.17	8.0	12	8.6	.3	15	1.1L	w197291
w197292	110	11	2.2	.12	20	13	17	.9	24	2.4L	w197292
w197293	120	36	3.1	.35	37	11	25	1.9	47	5.8L	w197293
w197294	93G	20	2.2	.07	8.0	6.7	12	.8	11	3.0L	w197294
w197295	97G	13	3.6	.23	13	16	9.9	.8	19	3.1L	w197295
w197296	150	7	1.8	1.1	7.0	10	15	.7	14	3.2L	w197296
w197297	160	13	5.7	.05	17	4.0	8.8	.3	11	3.5L	w197297
w194825	64	95	1.3	.18	42	9.8	50	3.1	77	9.5L	w194825
w194856	120	65	2.8	.16	31	4.5	31	2.1	50	5.3L	w194856
w194857	98G	21	1.7	.04	5.0	2.8	11	.8	6.8	3.1L	w194857
w194858	61	18	1.6	1.6	12	3.0	11	.8	11	3.2L	w194858
w194859	55G	29	3.1	.15	15	3.1	10	.6	8.8	1.8L	w194859
w194860	81G	42	2.7	.29	11	3.9	10	1.0	6.9	2.6L	w194860
w194861	90G	26	2.3	9.0	8.0	12	12	.9	21	2.9L	w194861
w194862	100G	26	2.7	.06	8.0	2.2	11	.9	4.7	3.4L	w194862
w194863	69	33	2.5	.24	14	4.0	30	1.2	15	4.1L	w194863
w194864	97G	63	3.0	.06	25	3.6	14	1.4	23	3.1L	w194864
w194865	62G	11	2.6	.09	6.0	13	4.5	.4	4.8	2.0L	w194865
w194866	89	50	3.6	.16	20	9.6	16	1.4	16	3.1L	w194866
w196338	98G	48	2.4	.10	22	9.1	20	1.3	25	2.2L	w196338
w196339	91G	13	1.4	.45	4.0	1.4	8.2	.4	8.6	2.0L	w196339
w196340	130G	30	2.0	.43	6.0	5.6	11	1.0	17	2.9L	w196340
w196341	110G	22	2.0	.24	5.0	3.5	12	.8	13	2.4L	w196341
w196342	32G	16	2.3	.14	10	22	6.6	.7L	11	.9	w196342
w196343	41G	13	1.6	.23	10	18	4.8	.7L	12	.9L	w196343
w196344	66G	15	2.6	.79	6.0	5.2	8.6	1.3	9.9	1.6	w196344
w196345	70G	11	2.8	.08	6.0	6.8	7.2	.5	18	1.5L	w196345
w196346	73G	20	2.4	.02	22	29	15	.3	26	1.6L	w196346
w196347	72G	13	2.3	.06	10	13	12	.4	21	1.6L	w196347
w196348	55G	10	2.2	.04	4.0	5.1	6.2	.4	14	1.2L	w196348

Table 10h.--Major, minor, and trace element composition of 49 bituminous coal samples from Indiana reported on whole-coal basis--continued

Sample number	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	Ho-S (ppm)	La (ppm)	Sample number
w194388	0.9L	0.30	170	3.6	0.62L	11	0.5	0.040	0.88L	6	w194388
w194389	1.0	.28	20L	3.7	2.2	12	.5	.020	.63L	6	w194389
w194390	.9L	.35	76	11	2.7	32	.4	.010L	.62L	9	w194390
w194391	.9L	.47	20L	7.3	.94L	20	.7	.020	.66L	12	w194391
w194392	1.2	.43	20L	7.8	2.4	26	.4	.020	.55L	13	w194392
w194393	1.8	.21	20L	6.2	.92L	17	.4	.050	.92L	3	w194393
w194394	1.2L	.26	32	6.1	1.2L	25	.4	.10	.84L	4	w194394
w194395	4.2L	1.5	180	18	2.9L	2.5	2.6	.040	2.9L	55	w194395
w194396	1.3L	.85	57	7.0	2.2	15	.8	.060	.92L	17	w194396
w194397	1.3L	.22	22	6.4	.92L	12	.5	.10	.92L	8	w194397
w197291	.4L	.24	28	4.9	.46	21	.2	.22	.25L	4	w197291
w197292	.8L	.48	48	5.7	.76	11	.4	.38	.53L	10	w197292
w197293	1.8L	.81	100	8.0	2.7	15	.9	.32	1.3L	19	w197293
w197294	.9L	.17	28	3.6	.65L	6.9	.5	.27	.65L	4	w197294
w197295	1.0L	.39	40	5.1	1.4	16	.5	.050	.68L	6	w197295
w197296	1.0L	.12	59	4.9	.70L	9.4	.4	.21	.70L	4	w197296
w197297	1.1L	.40	42	7.5	2.6	17	.3	.24	.76L	8	w197297
w194825	4.3L	.96	290	14	6.9	1.3	1.6	.28	3.0L	21	w194825
w194856	1.7L	.50	110	9.8	1.5	4.6	1.1	.18	1.2L	16	w194856
w194857	1.0L	.12	40	4.5	.69L	7.2	.4	.28	.69L	3	w194857
w194858	1.0L	.23	64	3.5	.70L	6.4	.5	.20	.70L	6	w194858
w194859	.7	.35	36	3.7	1.1	12	.4	.17	.39L	8	w194859
w194860	.8L	.22	39	3.0	.57L	5.3	.4	.24	.57L	6	w194860
w194861	.9L	.16	32	4.3	.63L	11	.6	.20	.63L	5	w194861
w194862	1.1L	.14	39	3.5	2.1	7.4	.6	.26	.74L	5	w194862
w194863	1.3L	.23	50	5.0	.89L	13	.8	.24	.89L	6	w194863
w194864	1.0L	.66	88	5.0	3.3	8.2	.5	.28	.68L	13	w194864
w194865	.7	.18	50	2.7	.43L	13	.2	.30	.43L	3	w194865
w194866	1.0L	.45	76	5.7	1.1	16	.6	.10	.69L	11	w194866
w196338	1.0L	.52	140	5.0	1.4	13	.7	.010L	.69L	13	w196338
w196339	.9L	.09	32	1.3	1.4	5.6	.6	.060	.64L	2	w196339
w196340	1.3L	.08	180	2.5	.92L	3.3	.4	.090	.92L	3	w196340
w196341	1.1L	.11	120	1.9	1.7	4.2	.4	.020	.78L	3	w196341
w196342	.3L	.28	56	2.7	1.1	13	.5L	.060	.48L	7	w196342
w196343	.5	.32	42	3.8	.90	19	.4	.10	.29L	6	w196343
w196344	.7L	.14	120	3.7	1.2	16	.4	.020	.46L	4	w196344
w196345	1.0	.16	68	4.4	.49L	18	.3	.14	.49L	3	w196345
w196346	.7L	.42	88	4.2	1.1	18	.4	.050	.51L	13	w196346
w196347	.7L	.24	72	4.6	.50L	18	.4	.060	.50L	6	w196347
w196348	.7	.13	64	3.2	.39L	18	.2	.080	.39L	2	w196348

Table 10h.--Major, minor, and trace element composition of 49 bituminous coal samples from Indiana reported on whole-coal basis--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	P (ppm)	Pb (ppm)	Pr-S (ppm)	Sample number
w194388	6.4	0.1	16	12	1.2	5.4	21	15	3.9	6.0L	w194388
w194389	14	.2	7.0	16	1.9	14	26	4	9.9	6.1L	w194389
w194390	7.3	.1	8.9	1.2	2.0	20	68	210	12	6.1L	w194390
w194391	13	.2	7.5	1.9	1.4	10	43	160	38	6.4L	w194391
w194392	11	.1	6.8	2.4	1.6	14	51	110	28	5.4L	w194392
w194393	5.1	.1	42	4.1	2.0	6.1L	29	52	11	9.0L	w194393
w194394	5.8	.1	47	4.0	2.5	5.5L	36	52	26	8.2L	w194394
w194395	210	.7	110	3.4	4.2	22	30	130	29	28L	w194395
w194396	37	.3	32	3.3	2.0	9.0	34	58	40	9.0L	w194396
w194397	12	.1	31	3.9	1.8	6.0L	10	190	13	8.9L	w194397
w197291	4.2	.1	7.0	.77	.25	2.0	22	28	9.8	2.4L	w197291
w197292	14	.2	8.4	.84	.61	5.3	21	46	14	5.2L	w197292
w197293	49	.3	86	3.3	1.6	15	35	87	42	12L	w197293
w197294	8.1	.1	20	2.9	2.0	4.3L	16	73	16	6.3L	w197294
w197295	7.9	.1	7.7	1.4	1.1	4.5L	21	21	28	6.6L	w197295
w197296	17	.1	11	1.5	.70	4.6L	23	52	7.9	6.8L	w197296
w197297	5.7	.1	20	1.3	1.4	7.4	17	86	36	7.4L	w197297
w194825	47	.3	47	7.3	1.3	20L	35	300	60	29L	w194825
w194856	32	.2	17	4.0	2.0	18	18	58	12	11L	w194856
w194857	3.9	.1	46	.59	.98	4.5L	6.7	21	7.8	6.7L	w194857
w194858	4.0	.1	16	5.3	1.1	6.6	10	22	3.0	6.8L	w194858
w194859	3.9	.1	8.3	2.2	.88	10	9.9	99	3.9	3.7L	w194859
w194860	3.8	.1	21	1.7	1.3	4.9	8.9	11	3.1	5.5L	w194860
w194861	5.4	.1	16	8.5	1.4	4.1L	34	67	12	6.1L	w194861
w194862	12	.1	57	4.9	2.1	4.8L	8.2	5	2.4	7.1L	w194862
w194863	13	.1	15	12	1.9	6.7	15	22	8.1	8.6L	w194863
w194864	12	.1	20	2.8	1.7	16	12	510	5.8	6.6L	w194864
w194865	2.5	.1	8.7	2.0	1.7	2.9L	28	30	33	4.2L	w194865
w194866	14	.1	9.8	2.4	1.7	17	24	100	14	6.7L	w194866
w196338	20	.1	7.7	.98	1.4	9.8	29	120	17	6.7L	w196338
w196339	2.9	.1	150	1.5	.36	4.2L	3.3	60	.91L	6.2L	w196339
w196340	9.3	.1	110	.92	1.2	6.0L	8.8	6	3.3	8.9L	w196340
w196341	7.1	.1	110	1.7	1.3	5.1L	7.7	34	3.2	7.5L	w196341
w196342	3.8	.1L	4.5	.61	.70	7.0	51	74	9.0	3.8	w196342
w196343	3.2	.1L	11	.70	.37	4.9	27	130	11	3.8	w196343
w196344	4.0	.1	28	2.4	1.1	4.6	42	26	9.9	4.5L	w196344
w196345	6.4	.1	11	2.7	2.2	3.4	45	28	16	4.8L	w196345
w196346	15	.1	4.7	1.2	.80	7.3	58	110	37	5.8	w196346
w196347	9.4	.1	12	1.2	1.0	4.1	30	53	23	4.9L	w196347
w196348	5.3	.1	7.2	1.5	1.4	2.5L	36	12	13	3.7L	w196348

Table 10h.--Major, minor, and trace element composition of 49 bituminous coal samples from Indiana reported on whole-coal basis--continued

Sample number	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	Sample number
w194388	9	0.50	2.4	1.5	1.4	0.62L	12	0.2	3.0L	0.88L	w194388
w194389	16	.50	2.3	1.7	B	.63L	16	.5L	3.0L	.90L	w194389
w194390	21L	.70	2.4	2.1	1.5	.62L	130	.2	3.0L	.89L	w194390
w194391	26L	2.5	3.6	5.1	2.2	.66L	72	.3	3.0L	.94L	w194391
w194392	23L	3.0	2.9	4.8	2.2	.55L	57	.6	3.0L	.79L	w194392
w194393	19	.40	1.8	3.6	.90	.92L	5.3	.2	3.0L	1.3L	w194393
w194394	24L	.30	2.0	3.1	1.1	.84L	5.3	.3	3.0L	1.2L	w194394
w194395	93	2.5	18	4.1	8.1	2.9L	80	1	17	4.2L	w194395
w194396	17	4.0	6.3	2.8	4.2	.92L	22	.5	3.0L	1.3L	w194396
w194397	14	.60	2.6	1.9	1.3	.92L	62	.5L	3.0L	7.7	w194397
w197291	17L	2.2	2.4	2.1	1.1	.42	8.8	.2	3.0L	.63	w197291
w197292	22L	1.6	5.0	3.7	2.3	.53L	16	.3	3.0L	.76L	w197292
w197293	30	3.8	6.9	2.4	3.9	1.3L	24	.7	5.0	1.8L	w197293
w197294	18	.90	2.5	1.3	.80	.65L	23	.1	3.0L	.93L	w197294
w197295	15	2.3	2.9	4.9	1.9	.68L	3.9	.3	3.0L	.97L	w197295
w197296	23L	2.0	4.0	2.1	.60	.70	4.2	.1	3.0L	1.0L	w197296
w197297	26L	.80	4.1	4.4	1.7	+.1	50	.3	3.0L	1.1L	w197297
w194825	61	2.2	9.0	3.7	4.6	.86	69	.8	3.0L	1.3L	w194825
w194856	38	1.8	3.0	1.5	2.5	1.7	42	.4	3.0L	1.7L	w194856
w194857	25L	.30	2.4	1.2	.50	.69L	14	.4L	3.0L	.98L	w194857
w194858	16	1.1	2.2	2.5	1.2	.70L	16	.2	6.0	1.0L	w194858
w194859	12	.90	2.6	1.1	1.6	50	60	.2	3.0L	.83L	w194859
w194860	15	.30	2.1	1.5	1.1	.57L	11	.2	3.0L	.81L	w194860
w194861	18	.70	2.8	3.2	.80	.63L	9.9	.2	3.0L	.90L	w194861
w194862	12	.90	2.1	2.0	.70	.74L	17	.1	3.0L	1.1L	w194862
w194863	17	1.1	4.0	5.2	1.4	.89L	17	.2	5.0	1.3L	w194863
w194864	21	1.0	3.7	2.4	2.7	.68L	160	.4	3.0L	.97L	w194864
w194865	19L	.70	2.5	1.5	.60	.43L	11	.4L	3.0L	.62L	w194865
w194866	17	4.6	3.6	.7	2.2	.69L	78	.2	3.0L	.98L	w194866
w196338	51L	1.3	4.4	3.4	2.3	.49	120	.3	3.0L	.29L	w196338
w196339	32L	1.3	1.0	2.7	.40	.18L	17	.5	3.0L	.27L	w196339
w196340	37L	.60	2.3	1.6	.40	.26L	25	.6L	3.0L	.39L	w196340
w196341	39L	.70	1.7	2.0	.40	.22L	26	.5L	3.0L	.33L	w196341
w196342	29L	1.6	1.5	2.0L	1.4	.06L	80	.3	3.0L	.10L	w196342
w196343	29L	2.6	1.7	1.4	1.6	.08L	45	.2	3.0L	.12L	w196343
w196344	32L	1.0	3.4	1.5	.60	.13L	15	.6L	3.0L	.20L	w196344
w196345	36L	1.4	2.3	3.1	.70	.14L	18	.2	3.0L	.21L	w196345
w196346	43L	3.8	4.1	4.7	2.4	.15L	47	.4	3.0L	.22L	w196346
w196347	39L	2.0	2.9	4.2	1.1	.14L	28	.7L	3.0L	.22L	w196347
w196348	28L	1.9	1.9	3.1	.50	.11L	9.9	.3	3.0L	.17L	w196348

Table 10h.--Major, minor, and trace element composition of 49 bituminous coal samples from Indiana reported on whole-coal basis--continued

Sample number	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w194388	5.7	22	3.5	0.7	160	6.2	w194388
w194389	6.5	31	8.5	.7	17	20	w194389
w194390	1.9	16	N	.4	120	14	w194390
w194391	1.4	15	N	1.0	53	9.4	w194391
w194392	1.0	19	N	.7	28	12	w194392
w194393	2.8	12	N	.6	8.7	10	w194393
w194394	1.2	13	N	.6	7.2	14	w194394
w194395	7.6	84	12	4.0	120	30	w194395
w194396	7.1	36	6.5	1.9	17	9.9	w194396
w194397	1.4	11	3.7	.6	9.2	13	w194397
w197291	1.4	6.3	1.7	.4	42	3.2	w197291
w197292	2.6	14	2.1	.9	29	4.7	w197292
w197293	5.9	36	7.8	1.9	40	10	w197293
w197294	1.3	12	3.5	.5	9.3	18	w197294
w197295	1.8	14	2.6	.8	48	4.9	w197295
w197296	1.1	12	1.5	.4	66	5.5	w197296
w197297	1.1	8.1	5.8	.7	9.3	14	w197297
w194825	11	64	7.7	1.6	28	17	w194825
w194856	4.6	38	7.5	1.3	68	17	w194856
w194857	.70	9.6	1.9	.4	8.1	6.3	w194857
w194858	3.6	31	3.8	.6	230	8.7	w194858
w194859	1.4	14	4.7	.6	23	8.3	w194859
w194860	1.4	11	4.6	.6	42	11	w194860
w194861	1.8	14	4.0	.6	300	12	w194861
w194862	.70	15	4.7	.5	6.5	21	w194862
w194863	15	120	3.2	.6	39	17	w194863
w194864	2.1	21	9.7	.8	12	19	w194864
w194865	1.1	8.1	3.6	.3	32	14	w194865
w194866	2.0	21	6.2	.7	50	15	w194866
w196338	2.0	20	5.0	.8	36	13	w196338
w196339	1.8	3.8	2.5	.3	18	6.3	w196339
w196340	.90	11	2.5	.4	28	20	w196340
w196341	1.2	11	3.2	.4	18	18	w196341
w196342	.80	4.8	3.5	.3	45	8.6	w196342
w196343	.70	3.3	3.3	.4	66	6.2	w196343
w196344	1.2	9.2	5.3	.8	30	13	w196344
w196345	.80	11	7.7	.8	29	19	w196345
w196346	.90	12	4.2	.9	8.0	8.8	w196346
w196347	.80	9.4	4.5	.8	19	9.4	w196347
w196348	.70	8.3	6.1	.7	18	13	w196348

Table 10h.--Major, minor, and trace element composition of 49 bituminous coal samples from Indiana reported on whole-coal basis--continued

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	Ag-S (ppm)	As (ppm)	Sample number
w196349	1.4	0.98	0.029	0.017	0.010	0.063	1.1	0.055	0.22	14	w196349
w196350	1.2	.69	.028	.015	.010	.060	1.2	.043	.14	16	w196350
w196351	.41	.21	.032	.013	.010	.017	2.6	.019	.07	52	w196351
w196352	1.2	.58	.033	.020	.010	.081	1.3	.047	.03	31	w196352
w196353	1.0	.69	.028	.013	.010	.054	2.4	.040	.31	95	w196353
w196354	.86	.47	.030	.015	.010	.049	2.0	.035	.22	53	w196354
w196355	.66	.43	.018	.007	.010L	.018	.27	.022	.07	4.0	w196355
w196356	.64	.28	.019	.008	.010L	.020	.41	.021	.09	5.0	w196356
w196357	.72	.58	.019	.008	.010L	.018	.15	.024	.03	3.0	w196357

Table 10h.--Major, minor, and trace element composition of 49 bituminous coal samples from Indiana reported on whole-coal basis--continued

Sample number	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Dy-S (ppm)	Sample number
w196349	77G	22	2.7	0.17	15	29	17	0.3	28	1.7L	w196349
w196350	65G	16	2.3	.12	7.0	18	12	.4	21	1.4L	w196350
w196351	62G	6	3.2	.30	2.0	9.7	3.1	.7L	9.3	1.4L	w196351
w196352	65G	11	2.0	.05	6.0	7.1	7.0	.9	21	1.4L	w196352
w196353	82G	14	2.3	3.5	13	32	19	.4	25	1.8L	w196353
w196354	68G	11	2.4	1.2	7.0	15	10	.4	18	1.5L	w196354
w196355	30G	6	3.9	.17	4.0	12	7.2	.2	13	1.0	w196355
w196356	29G	5	3.2	.05	3.0	6.6	5.0	.2	8.1	1.0	w196356
w196357	33G	8	3.3	.43	5.0	19	10	.6L	19	1.1	w196357

Table 10h.--Major, minor, and trace element composition of 49 bituminous coal samples from Indiana reported on whole-coal basis--continued

Sample number	Er-S (ppm)	Eu (ppm)	F (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	Hg (ppm)	Ho-S (ppm)	La (ppm)	Sample number
w196349	0.8L	0.26	60	3.9	0.54L	14	0.4	0.13	0.54L	8	w196349
w196350	.7L	.22	13	4.2	1.0	16	.2	.030	.46L	4	w196350
w196351	.6L	.10	66	6.8	.43L	N	.5L	.14	.43L	1	w196351
w196352	.7L	.09	68	4.6	.46L	17	.3	.060	.46L	3	w196352
w196353	.8L	.22	34	5.2	.57L	N	.3	.30	.57L	7	w196353
w196354	.7L	.17	26	6.7	.48L	29	.3	.11	.48L	4	w196354
w196355	.5	.16	76	2.7	.63	7.2	.3	.060	.27	2	w196355
w196356	.5	.17	35	1.7	.84	4.6	.2	.030	.35	2	w196356
w196357	.5	.15	80	3.6	.73	8.9	.3	.010L	.26	3	w196357

Table 10h.--Major, minor, and trace element composition of 49 bituminous coal samples from Indiana reported on whole-coal basis--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	P (ppm)	Pb (ppm)	Pr-S (ppm)	Sample number
w196349	18	0.1	3.9	1.9	0.62	4.9	75	87	44	5.2L	w196349
w196350	10	.1	5.7	1.4	.72	3.4	50	45	23	4.4L	w196350
w196351	1.4	.1	9.3	4.4	1.3	2.9L	45	3	34	4.2L	w196351
w196352	6.1	.1	6.5	1.0	.72	3.0L	16	11	11	4.4L	w196352
w196353	9.0	.1	5.4	3.9	1.6	5.6	98	50	62	5.6L	w196353
w196354	5.2	.1	6.5	2.4	1.2	3.1L	52	21	40	4.6L	w196354
w196355	3.3	.1	3.0	.57	.63	1.9	63	5	6.9	2.0L	w196355
w196356	1.6	.1	3.2	.75	.67	1.8	35	6	6.4	2.0L	w196356
w196357	5.3	.1	3.2	.46	.83	2.1	96	7	8.6	2.2L	w196357

Table 10h.--Major, minor, and trace element composition of 49 bituminous coal samples from Indiana reported on whole-coal basis--continued

Sample number	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	Sample number
w196349	38L	4.0	4.5	5.5	1.5	0.15L	43	0.3	3.0L	1.0	w196349
w196350	31L	3.0	3.2	3.1	.90	.13L	27	.2	3.0L	.20L	w196350
w196351	31L	2.3	2.6	4.0	.40	N	8.7	.7L	3.0L	.19L	w196351
w196352	30L	3.2	2.1	2.0	.60	.13L	9.1	.3	3.0L	.20L	w196352
w196353	40L	7.4	4.0	5.9	1.2	.16L	28	.3	3.0L	.25L	w196353
w196354	32L	4.4	3.0	3.5	.70	.14L	16	.7L	3.0L	.20L	w196354
w196355	25L	.50	2.3	3.6	.60	.06L	6.0	.3	3.0L	.09L	w196355
w196356	22L	.30	1.0	4.1	.60	.06L	5.8	.2	3.0L	.09L	w196356
w196357	23L	1.3	3.6	1.9	.60	.13	6.9	.4	3.0L	.10L	w196357

Table 10h.--Major, minor, and trace element composition of 49 bituminous coal samples from Indiana reported on whole-coal basis--continued

Sample number	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w196349	1.1	15	3.4	1.0	110	5.9	w196349
w196350	.90	10	3.9	.7	72	6.5	w196350
w196351	.90	6.8	4.5	.6	120	17	w196351
w196352	.90	6.4	3.4	.8	20	6.2	w196352
w196353	1.2	16	3.4	.6	1,600	16	w196353
w196354	.90	9.5	3.6	.6	170	8.8	w196354
w196355	.90	6.3	4.5	.7	30	5.7	w196355
w196356	.80	4.1	4.9	.7	12	6.4	w196356
w196357	1.2	14	5.3	.7	79	14	w196357

Summary of the analytical data on 15 Massachusets and Rhode Island anthracite samples

A complete summary of all published analytical data on these coals was compiled by Lyons and Chase (1979). The areal distribution of the 15 samples of this report is shown on figure 9. Statistical data on the 15 samples are presented in tables 11a, b and c; the analytical data in tables 11e, f, g and h. Specific sample locations and descriptions are presented in table 11d.

In the following discussion the geometric means of the analytical data on these anthracite samples are compared with those of the Pennsylvania anthracite samples reported by Swanson and others (1976).

Comparison of the geometric means for the proximate and ultimate analyses, (table 11a), shows higher mean values for the volatile matter, fixed carbon, hydrogen, carbon, and nitrogen in Pennsylvania anthracite. The moisture, ash and oxygen contents are higher in Rhode Island and Massachusetts anthracite. These data are computed on the as-received basis. When the data are computed on a moisture and ash-free basis, the fixed carbon and volatile matter mean values for the Massachusetts and Rhode Island samples are 92.3 percent and 5.0 percent, for Pennsylvania anthracite, 90.0 percent and 7.2 percent. This indicates that the rank of the coal is similar.

Comparison of the geometric means for the major and minor element oxides, (table 11b), shows that SiO_2, CaO, MgO, K_2O, Fe_2O_3 and MnO are significantly higher in the Massachusetts and Rhode Island coal ash, whereas, Al_2O_3 and TiO_2 are significantly lower. The high mean value for SiO_2 in these coal ash samples suggests that a considerable amount of quartz is present in this ash.

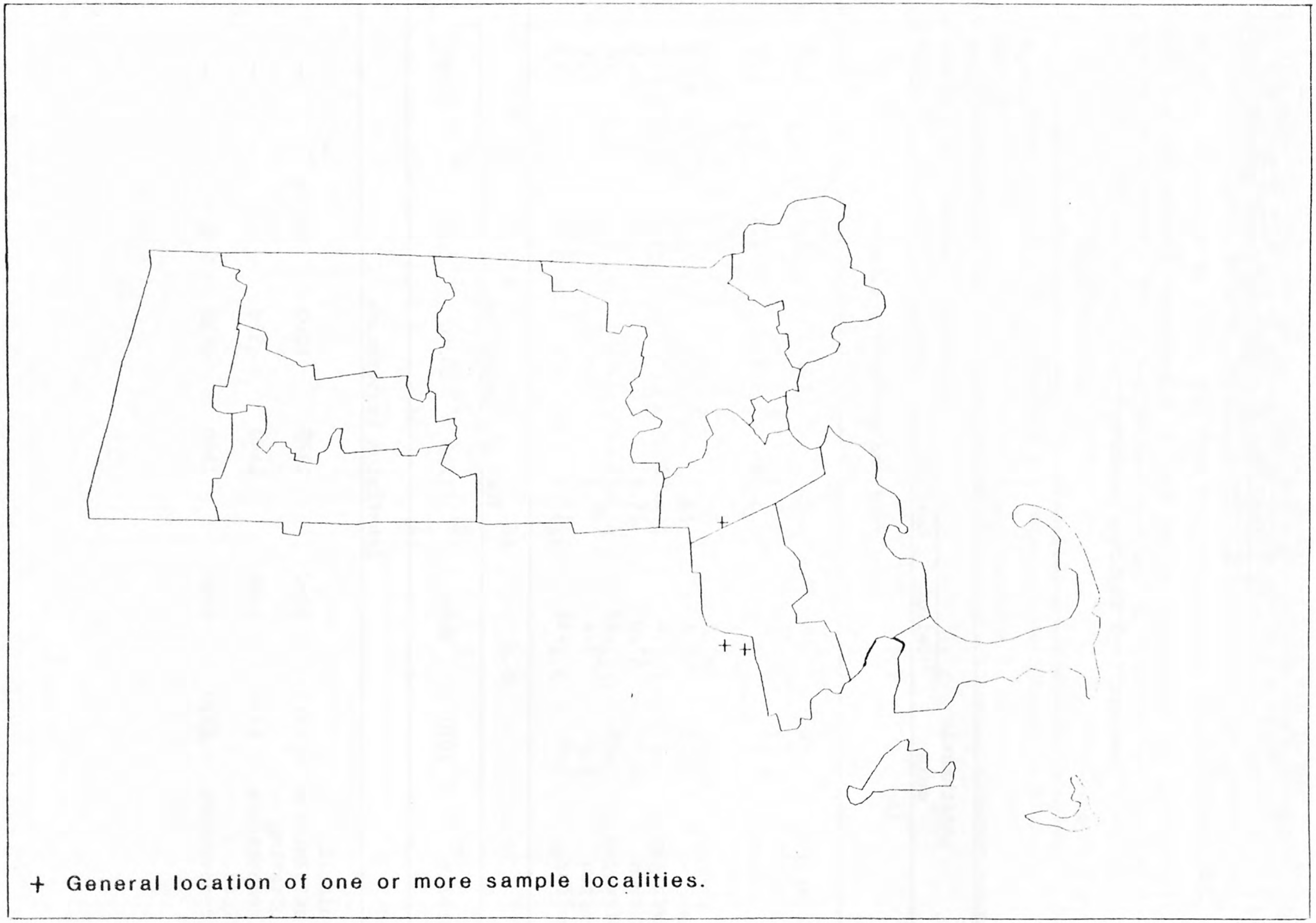

Figure 9.--Distribution of Massachusetts and Rhode Island anthracite samples.

Table 11a.-- Arithmetic mean, observed range, geometric mean and geometric deviation of proximate and ultimate analyses, heat of combustion, forms of sulfur, ash-fusion temperatures and free-swelling index of 15 coal samples from Massachusetts and Rhode Island.

[All values are in percent except Btu/lb, ash-fusion temperatures and free-swelling index and are reported on the as-received basis. °F = 9/5°C + 32; Kcal/kg = 0.556 (Btu/lb). Leaders (--) indicate no data.]

	Arithmetic mean	Observed range Minimum	Observed range Maximum	Geometric mean	Geometric deviation	Geometric mean 38 Pennsylvania Anthracite samples (Swanson and others 1976)
Proximate and ultimate analyses						
Moisture	.64	0.5	6.3	2.1	3.6	1.3
Volatile matter	3.94	3.0	5.39	3.81	1.4	6.3
Fixed carbon	14.1	66.8	76.1	70.6	1.1	78.8
Ash	4.43	15.7	29.7	21.4	1.4	11.1
Hydrogen	.14	.4	.92	.66	1.6	2.3
Carbon	14.3	67.0	76.8	71.4	1.1	79.5
Nitrogen	.05	.22	.27	.24	1.1	.8
Oxygen	1.1	2.4	7.1	4.8	1.8	3.1
Sulfur	1.0	.11	15.0	.76	14.0	.7
Heat of combustion						
Btu/lb	2070	9650	11200	10340	1.1	12690
Ash-fusion temperature °C						
Initial deformation	1310	1240	1370	1300	1.0	--
Softening temperature	1370	1300	1440	1370	1.0	--
Fluid temperature	1530	1480	1580	1520	1.0	--

Table 11b.--Arithmetic mean, observed range, geometric mean and geometric deviation of ash content and contents of eleven major and minor oxides in the laboratory ash of 15 coal samples from Massachussetts and Rhode Island.

[All samples were ashed at 525°C; all data except geometric deviation are in percent.]

Oxide	Arithmetic mean	Observed range		Geometric mean	Geometric deviation	Geometric mean 53 Pennsylvania anthracite samples (Swanson and others 1976)
		Minimum	Maximum			
(Ash)	22.9	11.6	47.2	20.9	1.6	10.9
SiO_2	66	50	80	65	1.2	42
Al_2O_3	13	5.4	25	12	1.6	30
CaO	6.6	.58	14	5.0	2.4	.58
MgO	2.2	1.1	2.8	2.1	1.3	.66
Na_2O	.37	.17	.9	.33	1.6	.40
K_2O	2.9	1.0	6.0	2.5	1.7	1.8
Fe_2O_3	6.1	3.4	8.2	5.9	1.3	3.9
MnO	.21	.08	.37	.19	1.6	.01
TiO_2	.48	.12	1.2	.38	2.0	1.8
P_2O_5	.08	.007	.15	.06	2.3	--
SO_3	.68	.02	1.5	.45	3.5	.31

Comparisons of the geometric means for trace elements are made on 26 of the elements (table 11c). Most of the rare earth elements were not reported in Pennsylvania anthracite, whereas, As, Ga, Nd and Se were not detected in Massachusetts and Rhode Island anthracite. Of the 26 elements, As, Ba, F, Mn, Sb, Sr, and Zn have higher mean values in Massachusetts and Rhode Island anthracite, B and Be are about equal, whereas, the other 17 elements have higher mean values in Pennsylvania anthracite.

Table 11c.--Arithmetic mean, observed range, geometric mean, and geometric deviation of 38 elements in 15 coal samples from Massachussetts and Rhode Island.

[All data are in parts per million and are reported on a whole-coal basis. Leaders (--) indicate means could not be calculated because an insufficient number of analyses were above the detection limit.]

Element	Arithmetic mean	Observed range		Geometric mean	Geometric deviation	Geometric mean 53 Pennsylvania Anthracite samples (Swanson and others 1976)
		Minimum	Maximum			
As	9.5	3.0	45	7.0	2.0	4.0
B	11	6.1	17	10	1.4	10
Ba	130	50	380	110	1.8	70
Be	1.1	.35	2.8	.86	1.9	1.0
Cd	.15	.02	.63	.08	3.0	.19
Ce	14	4.0	57	9.8	2.3	--
Co	4.6	1.1	17	3.1	2.4	5
Cr	17	4.2	54	12	2.3	20
Cs	2.2	.8	5.6	1.8	1.9	--
Cu	7.8	2.3	37	5.5	2.1	22
Eu	.28	.08	1.1	.20	2.2	--
F	180	57	430	140	2.1	41
Ga	4.7	.93	20	3.1	2.4	5
Hf	.81	.2	2.5	.55	2.5	--
Hg	.06	.01	.31	.02	3.6	.11
La	7.5	2.0	28	5.1	2.3	--
Li	14	4.6	27	12	1.8	24
Lu	.16	.1	.4	.11	1.9	--
Mn	320	180	480	300	1.4	4.2
Mo	1.3	.35	3.3	.55	2.9	1.5
Nb	2.8	.64	11	1.2	3.2	3.2
Ni	10	4.1	31	8.9	1.7	15
Pb	8.9	2.4	29	7.1	2.0	7.5
Sb	1.2	.5	2.3	1.0	1.6	.6
Sc	3.9	.8	15	2.5	2.5	3
Sm	1.4	.3	4.9	.89	2.4	--
Sr	95	49	210	88	1.5	50
Tb	.28	.1	.7	.12	2.8	--
U	.63	.2	1.6	.47	2.0	1.2
V	21	5.0	80	15	2.2	20
Y	5.2	2.0	14	4.3	1.8	7
Yb	.72	.2	2.4	.52	2.2	.7
Zn	29	9.1	85	24	1.9	10
Zr	30	9.1	97	21	2.3	30

Table 11d.--Descriptions for 15 anthracite coal samples from Massachusetts and Rhode Island.

Sample no.	State	County	Latitude	Longitude	Formation	Coal Bed	Sample type	Sampled thickness (inches)
w193881	Massachusetts	Norfolk	420224n	711625w	Rhode Island	A	Drill Core	72.0
w193883	Massachusetts	Norfolk	420224n	711625w	Rhode Island	A	Drill Core	72.0
w194730	Massachusetts	Bristol	414247n	711134w	Rhode Island	Seam A	Drill Core	
w194731	Massachusetts	Bristol	414247n	711134w	Rhode Island	Seam A	Drill Core	
w194729	Massachusetts	Bristol	414247n	711134w	Rhode Island	Seam A	Drill Core	
w193926	Rhode Island	Bristol	414328n	711549w	No Data Entered	No Data Entered	Drill Core	
w193927	Rhode Island	Bristol	414328n	711549w	No Data Entered	No Data Entered	Drill Core	
w193928	Rhode Island	Bristol	414328n	711549w	No Data Entered	No Data Entered	Drill Core	
w193929	Rhode Island	Bristol	414328n	711549w	No Data Entered	No Data Entered	Drill Core	
w193930	Rhode Island	Bristol	414328n	711549w	No Data Entered	No Data Entered	Drill Core	
w198549	Rhode Island	Bristol	414024n	711648w	Bristol	B	Drill Core	12.0
w198550	Rhode Island	Bristol	414024n	711648w	Bristol	B	Drill Core	11.0
w198551	Rhode Island	Bristol	414024n	711648w	Bristol	B	Drill Core	10.0
w198552	Rhode Island	Bristol	414024n	711648w	Bristol	B	Drill Core	14.0
w198553	Rhode Island	Bristol	414024n	711648w	Bristol	B	Drill Core	11.0

Table 11e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 3 anthracite coal samples from Rhode Island and Massachusetts.

[All analyses except Kcal/kg, Btu, free-swelling index and ash-fusion temperatures in percent. For each sample number, the analyses are reported three ways; first, as-received, second, moisture free, and third, moisture and ash free. All analyses by Coal Analysis Section, Department of Energy, Pittsburgh, Pa. B, not determined. 1600G for ash-fusion temperatures means greater than 1600 C.]

	Proximate Analysis				Ultimate Analysis					Heat of Combustion	
Sample number	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
w194730	6.3	3.4	69.3	21.0	0.9	70.6	0.2	7.1	0.1	5,680	10,220
	---	3.7	73.9	22.4	.2	75.4	.3	1.6	.1	6,060	10,910
	---	4.7	95.3	---	.3	97.1	.3	2.1	.2	7,810	14,060
w194731	.5	3.0	66.8	29.7	.4	67.0	.2	2.4	.3	5,360	9,650
	---	3.0	67.1	29.8	.3	67.3	.2	2.0	.3	5,390	9,690
	---	4.3	95.7	---	.5	95.9	.3	2.9	.4	7,680	13,820
w194729	2.7	5.4	76.1	15.7	.8	76.8	.3	6.2	15.0	6,220	11,200
	---	5.5	78.3	16.2	.5	79.0	.3	3.9	15.4	6,400	11,520
	---	6.6	93.4	---	.6	94.2	.3	4.7	18.4	7,630	13,740

Table 11e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 3 anthracite coal samples from Rhode Island and Massachusetts--continued

		Forms of sulfur				Ash fusion temperature C		
Sample number	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
w194730	0.0	B	B	B	0.0	1,260	1,320	1,495
	---	B	B	B				
	---	B	B	B				
w194731	.0	B	B	B	.0	1,325	1,380	1,505
	---	B	B	B				
	---	B	B	B				
w194729	.0	B	B	B	.0	1,390	1,460	1,600
	---	B	B	B				
	---	B	B	B				

Table 11f.--Major and minor oxide and trace element compostion of the laboratory ash of 15 anthracite coal samples from Rhode Island and Massachusetts.

[Values in percent or parts-per-million. Coal ashed at 525 C. L means less than the value shown; N, not detected; B, not determined; S after element title indicates determinations by automatic plate reading computer assisted, emission spectographic analyses. The standard deviation of any single answer should be taken as plus 50% and minus 35%. Methods of analyses for other elements as shown in figure 1.]

Sample number	Ash (percent)	SiO2 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
w193926	20.3	71	12	4.3	2.3	0.58	2.5	5.3	0.90	0.10	w193926
w193927	14.7	78	6.5	8.2	1.3	.51	1.6	3.4	.28	.01	w193927
w193928	12.9	56	14	14	2.8	.90	2.8	6.7	.27	.10	w193928
w193929	11.6	69	6.3	11	2.0	.32	1.3	4.6	.20	.06	w193929
w193930	11.6	62	11	12	2.8	.49	2.1	6.5	.26	.02	w193930
w198549	36.4	80	5.4	5.5	1.1	.22	1.0	3.6	.12	.03	w198549
w198550	23.3	63	14	5.0	2.0	.17	3.3	6.5	.38	.13	w198550
w198551	20.5	65	15	3.7	1.8	.20	3.8	6.5	.48	.10	w198551
w198552	27.3	50	20	9.5	2.8	.30	4.5	8.2	.51	.14	w198552
w198553	23.3	57	17	9.5	2.2	.23	4.0	5.6	.77	.11	w198553
w193881	47.2	53	25	.58	2.3	.41	6.0	8.1	1.2	.05	w193881
w193883	41.2	51	25	.96	2.3	.37	5.5	7.7	1.2	.05	w193883
w194730	21.1	80	8.8	3.5	2.0	.20	1.5	5.4	.27	.06	w194730
w194731	16.7	71	10	5.5	2.8	.25	2.2	6.7	.22	.15	w194731
w194729	15.9	78	7.9	5.0	2.5	.40	1.4	6.7	.21	.07	w194729

Table 11f.--Major and minor oxide and trace element compostion of the laboratory ash of 15 anthracite coal samples from Rhode Island and Massachusetts--continued

Sample number	SO3 (percent)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Sample number
w193926	0.79	77	560	5.0	0.24	49	14	100	8.4	14	w193926
w193927	.02	96	440	3.0	.38	27	7.5	52	6.8	39	w193927
w193928	.24	71	700	5.0	1.0	54	16	54	10	18	w193928
w193929	.15	120	430	3.0	.54	43	10	56	6.9	39	w193929
w193930	.04	83	540	3.0	.88	60	15	140	6.9	32	w193930
w198549	.90	17	220	1.5	.60	16	6.0	16	3.6	18	w198549
w198550	.65	31	490	3.0	.55	34	15	71	9.4	14	w198550
w198551	1.5	39	540	4.0	1.8	78	19	81	13	24	w198551
w198552	.87	30	750	4.0	2.3	73	26	95	14	11	w198552
w198553	.79	40	550	4.0	.40	56	60	81	12	14	w198553
w193881	.72	35	810	6.0	.22	100	37	110	12	79	w193881
w193883	.97	37	770	6.0	.20	140	19	120	12	42	w193883
w194730	.60	29	470	7.0	.10L	33	8.5	27	6.2	31	w194730
w194731	1.0	62	460	4.0	.14	24	9.0	29	9.6	28	w194731
w194729	.94	52	740	9.0	.10	31	10	26	8.2	69	w194729

Table 11f.--Major and minor oxide and trace element compostion of the laboratory ash of 15 anthracite coal samples from Rhode Island and Massachusetts--continued

Sample number	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Hf (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Sample number
w193926	0.89	14	8.0	6.9	25	46	0.5	950	4.0	38	w193926
w193927	.54	8.0	7.0L	2.0	14	38	.7L	1,300	2.0L	9	w193927
w193928	.93	21	10	2.3	23	89	.8	2,600	6.0	5	w193928
w193929	.69	8.0	9.0	1.7	17	40	.9L	1,800	3.0	6	w193929
w193930	.95	18	12	2.6	26	54	.9	2,300	3.0L	6	w193930
w198549	.33	4.0	11	1.1	8	58	.3	1,300	2.0L	2L	w198549
w198550	.94	18	8.0	3.0	17	84	.4	1,200	2.0L	5	w198550
w198551	1.5	17	11	2.9	49	100	.5	880	2.0L	7	w198551
w198552	1.5	25	11	4.0	40	100	.7	1,700	6.0	5	w198552
w198553	1.4	20	9.0	5.6	30	71	.4	1,300	4.0	5	w198553
w193881	1.7	42	8.0	5.3	53	50	.8	630	7.0	23	w193881
w193883	2.7	37	13	5.8	68	54	1	790	8.0	15	w193883
w194730	.71	9.0	7.0L	1.4	19	41	.5	2,200	3.0	3L	w194730
w194731	.72	14	7.0L	1.2	18	42	.6L	2,900	4.0	4	w194731
w194729	.82	8.0	7.0L	1.3	19	58	.6L	2,300	4.0	3L	w194729

Table 11f.--Major and minor oxide and trace element compostion of the laboratory ash of 15 anthracite coal samples from Rhode Island and Massachusetts--continued

Sample number	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Rb (ppm)	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Sample number
w193926	46L	47	28	170	13	4.4	7.0L	240	0.49	15L	w193926
w193927	46L	28	16	120	6.8	2.7	7.0L	400	3.4	20L	w193927
w193928	46L	47	48	170	11	3.9	7.0L	680	.78	23L	w193928
w193929	46L	38	28	110	6.9	2.6	7.0L	480	.86	26L	w193929
w193930	46L	84	63	170	9.5	4.3	8.0	530	4.3L	26L	w193930
w198549	46L	17	21	66	4.4	1.4	10	440	.82	8.2L	w198549
w198550	46L	39	17	180	14	3.9	16	410	2.6L	13L	w198550
w198551	46L	49	35	200	17	8.3	14	490	3.4L	15	w198551
w198552	46L	52	24	240	26	7.7	9.0	760	2.9L	11L	w198552
w198553	46L	35	49	240	19	5.6	16	550	3.0L	13L	w198553
w193881	46L	66	61	260	32	10	7.0L	170	1.5	15	w193881
w193883	120	48	26	240	29	12	7.0L	220	1.7	17	w193883
w194730	46L	40	90	19	6.6	3.3	30	360	.47	14L	w194730
w194731	46L	51	20	24	8.4	2.4	31	480	.60	18L	w194731
w194729	46L	38	62	19	6.9	3.1	40	580	.63	31	w194729

Table 11f.--Major and minor oxide and trace element compostion of the laboratory ash of 15 anthracite coal samples from Rhode Island and Massachusetts--continued

Sample number	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w193926	4.4	81	33	3.4	91	480	w193926
w193927	1.4L	45	20	2.0	62	140	w193927
w193928	1.6	77	27	3.1	120	97	w193928
w193929	2.6	43	22	1.7	81	99	w193929
w193930	1.7	77	30	2.6	110	93	w193930
w198549	.82	30	14	1.9	55	34	w198549
w198550	1.7	69	10	2.6	110	39	w198550
w198551	2.0	86	28	2.4	140	66	w198551
w198552	2.2	120	27	3.3	120	97	w198552
w198553	3.0	80	14	3.4	110	75	w198553
w193881	3.4	170	30	5.1	180	180	w193881
w193883	3.6	160	32	5.6	170	220	w193883
w194730	3.8	47	19	1.4	130	92	w194730
w194731	2.4	64	12	1.2	180	92	w194731
w194729	3.1	49	14	1.3	160	72	w194729

Table 11g.--Content of 22 trace elements in 15 anthracite coal samples from Rhode Island and Massachusetts.

[Analysis performed on whole-coal. Values in parts-per-million (ppm). L, less than the value shown; B, not determined.]

Sample number	As (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	La (ppm)	Sample number
w193926	5.0	10	2.9	21	1.7	0.18	130	1.4	0.010	5	w193926
w193927	9.0	4.0	1.1	7.6	1.0	.08	66	.3	.010	2	w193927
w193928	6.0	7.0	2.0	7.0	1.3	.12	94	.3	.010L	3	w193928
w193929	15	5.0	1.2	6.5	.8	.08	57	.2	.31	2	w193929
w193930	8.0	7.0	1.7	16	.8	.11	66	.3	.020	3	w193930
w198549	3.0	6.0	2.2	5.9	1.3	.12	280	.4	.030	3	w198549
w198550	6.0	8.0	3.4	17	2.2	.22	430	.7	.050	4	w198550
w198551	10	16	3.8	17	2.7	.31	400	.6	.030	10	w198551
w198552	10	20	7.0	26	3.7	.40	310	1.1	.030	11	w198552
w198553	45	13	14	19	2.8	.32	200	1.3	.020	7	w198553
w193881	9.0	49	17	54	5.6	.79	230	2.5	.050	25	w193881
w193883	3.0	57	7.9	50	4.9	1.1	190	2.4	.10	28	w193883
w194730	3.0	7.0	1.8	5.6	1.3	.15	74	.3	.010L	4	w194730
w194731	6.0	4.0	1.5	4.8	1.6	.12	93	.2	.010L	3	w194731
w194729	4.0	5.0	1.6	4.2	1.3	.13	60	.2	.010L	3	w194729

Table 11g.--Content of 22 trace elements in 15 anthracite coal samples from Rhode Island and Massachusetts--continued

Sample number	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Sm (ppm)	Tb (ppm)	Th (ppm)	U (ppm)	Sample number
w193926	0.1	870	89	35	1.0	2.7	0.90	0.1	3.0L	0.90	w193926
w193927	.1L	560	6	17	1.6	1.0	.40	.5	3.0L	.20L	w193927
w193928	.1	860	56	22	1.0	1.4	.50	.1	3.0L	.20	w193928
w193929	.1L	280	30	13	2.2	.80	.30	.1	3.0L	.30	w193929
w193930	.1	420	10	20	1.4	1.1	.50	.5L	3.0L	.20	w193930
w198549	.1	590	48	24	.50	1.6	.50	.3	3.0L	.30	w198549
w198550	.1	290	130	42	1.0	3.3	.90	.6L	3.0L	.40	w198550
w198551	.1	300	90	41	1.9	3.5	1.7	.7L	3.0	.40	w198551
w198552	.2	610	170	65	1.0	7.2	2.1	.8L	3.0L	.60	w198552
w198553	.1	400	110	55	.90	4.4	1.3	.7L	3.0L	.70	w198553
w193881	.4	1,400	100	120	2.3	15	4.7	.7	7.0	1.6	w193881
w193883	.4	1,100	90	98	.80	12	4.9	.7	7.0	1.5	w193883
w194730	.1	310	55	4	.50	1.4	.70	.1	3.0L	.80	w194730
w194731	.1L	310	110	4	.80	1.4	.40	.1	3.0L	.40	w194731
w194729	.1L	470	49	3	.60	1.1	.50	.1	5.0	.50	w194729

Table 11g.--Content of 22 trace elements in 15 anthracite coal samples from Rhode Island and Massachusetts--continued

Sample number	Yb (ppm)
w193926	0.7
w193927	.3
w193928	.4
w193929	.2
w193930	.3
w198549	.7
w198550	.6
w198551	.5
w198552	.9
w198553	.8
w193881	2.4
w193883	2.3
w194730	.3
w194731	.2
w194729	.2

Table 11h.--Major, minor, and trace element composition of 15 anthracite coal samples from Rhode Island and Massachusetts reported on whole-coal basis.

[Values in percent or parts-per-million. 22 values are from direct determinations on whole-coal; all other values calculated from analyses of ash. S means analysis by emission spectography; L, less than the value shown; N, not detected; B, not determined.]

Sample number	Si (percent)	Al (percent)	Ca (percent)	Mg (percent)	Na (percent)	K (percent)	Fe (percent)	Ti (percent)	As (ppm)	B-S (ppm)	Sample number
w193926	6.7	1.3	0.62	0.28	0.087	0.42	0.75	0.11	5.0	16	w193926
w193927	5.4	.51	.86	.12	.056	.20	.35	.025	9.0	14	w193927
w193928	3.4	.96	1.3	.22	.086	.30	.60	.021	6.0	9.2	w193928
w193929	3.7	.39	.91	.14	.028	.13	.37	.014	15	14	w193929
w193930	3.4	.68	.99	.20	.042	.20	.53	.018	8.0	9.6	w193930
w198549	14	1.0	1.4	.24	.059	.30	.92	.026	3.0	6.2	w198549
w198550	6.9	1.7	.83	.28	.029	.64	1.1	.053	6.0	7.2	w198550
w198551	6.2	1.6	.54	.22	.030	.65	.93	.059	10	8.0	w198551
w198552	6.4	2.9	1.9	.46	.061	1.0	1.6	.083	10	8.2	w198552
w198553	6.2	2.1	1.6	.30	.040	.78	.91	.11	45	9.3	w198553
w193881	12	6.2	.20	.66	.14	2.4	2.7	.34	9.0	17	w193881
w193883	9.8	5.4	.28	.58	.11	1.9	2.2	.30	3.0	15	w193883
w194730	7.9	.98	.53	.25	.031	.26	.80	.034	3.0	6.1	w194730
w194731	5.5	.88	.66	.28	.031	.31	.78	.022	6.0	10	w194731
w194729	5.8	.66	.57	.24	.047	.19	.74	.020	4.0	8.3	w194729

Table 11h.--Major, minor, and trace element composition of 15 anthracite coal samples from Rhode Island and Massachusetts reported on whole-coal basis--continued

Sample number	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Eu (ppm)	F (ppm)	Sample number
w193926	110	1.0	0.05	10	2.9	21	1.7	2.8	0.18	130	w193926
w193927	65	.4	.06	4.0	1.1	7.6	1.0	5.7	.08	66	w193927
w193928	90	.6	.13	7.0	2.0	7.0	1.3	2.3	.12	94	w193928
w193929	50	.3	.06	5.0	1.2	6.5	.8	4.5	.08	57	w193929
w193930	63	.3	.10	7.0	1.7	16	.8	3.7	.11	66	w193930
w198549	80	.5	.22	6.0	2.2	5.9	1.3	6.6	.12	280	w198549
w198550	110	.7	.13	8.0	3.4	17	2.2	3.3	.22	430	w198550
w198551	110	.8	.37	16	3.8	17	2.7	4.9	.31	400	w198551
w198552	200	1.1	.63	20	7.0	26	3.7	3.0	.40	310	w198552
w198553	130	.9	.09	13	14	19	2.8	3.3	.32	200	w198553
w193881	380	2.8	.10	49	17	54	5.6	37	.79	230	w193881
w193883	320	2.5	.08	57	7.9	50	4.9	17	1.1	190	w193883
w194730	99	1.5	.02L	7.0	1.8	5.6	1.3	6.5	.15	74	w194730
w194731	77	.7	.02	4.0	1.5	4.8	1.6	4.7	.12	93	w194731
w194729	120	1.4	.02	5.0	1.6	4.2	1.3	11	.13	60	w194729

Table 11h.--Major, minor, and trace element composition of 15 anthracite coal samples from Rhode Island and Massachusetts reported on whole-coal basis--continued

Sample number	Ga-S (ppm)	Gd-S (ppm)	Hf (ppm)	Hg (ppm)	La (ppm)	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Sample number
w193926	2.8	1.6	1.4	0.010	5	9.3	0.1	190	0.81	7.7	w193926
w193927	1.2	1.0L	.3	.010	2	5.6	.1L	190	.29L	1.3	w193927
w193928	2.7	1.3	.3	.010L	3	11	.1	340	.77	.65	w193928
w193929	.9	1.0	.2	.31	2	4.6	.1L	210	.35	.70	w193929
w193930	2.1	1.4	.3	.020	3	6.3	.1	270	.35L	.70	w193930
w198549	1.5	4.0	.4	.030	3	21	.1	470	.73L	.73L	w198549
w198550	4.2	1.9	.7	.050	4	20	.1	280	.47L	1.2	w198550
w198551	3.5	2.3	.6	.030	10	21	.1	180	.41L	1.4	w198551
w198552	6.8	3.0	1.1	.030	11	27	.2	460	1.6	1.4	w198552
w198553	4.7	2.1	1.3	.020	7	17	.1	300	.93	1.2	w198553
w193881	20	3.8	2.5	.050	25	24	.4	300	3.3	11	w193881
w193883	15	5.4	2.4	.10	28	22	.4	330	3.3	6.2	w193883
w194730	1.9	1.5L	.3	.010L	4	8.7	.1	460	.63	.63L	w194730
w194731	2.3	1.2L	.2	.010L	3	7.0	.1L	480	.67	.67	w194731
w194729	1.3	1.1L	.2	.010L	3	9.2	.1L	370	.64	.48L	w194729

Table 11h.--Major, minor, and trace element composition of 15 anthracite coal samples from Rhode Island and Massachusetts reported on whole-coal basis--continued

Sample number	Nd-S (ppm)	Ni-S (ppm)	P (ppm)	Pb (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Sample number
w193926	9.3L	9.5	89	5.7	35	1.0	2.7	0.90	1.4L	49	w193926
w193927	6.8L	4.1	6	2.4	17	1.6	1.0	.40	1.0L	59	w193927
w193928	5.9L	6.1	56	6.2	22	1.0	1.4	.50	.90L	88	w193928
w193929	5.3L	4.4	30	3.2	13	2.2	.80	.30	.81L	56	w193929
w193930	5.3L	9.7	10	7.3	20	1.4	1.1	.50	.93	61	w193930
w198549	17L	6.2	48	7.6	24	.50	1.6	.50	3.6	160	w198549
w198550	11L	9.1	130	4.0	42	1.0	3.3	.90	3.7	96	w198550
w198551	9.4L	10	90	7.2	41	1.9	3.5	1.7	2.9	100	w198551
w198552	13L	14	170	6.6	65	1.0	7.2	2.1	2.5	210	w198552
w198553	11L	8.2	110	11	55	.90	4.4	1.3	3.7	130	w198553
w193881	22L	31	100	29	120	2.3	15	4.7	3.3L	80	w193881
w193883	49	20	90	11	98	.80	12	4.9	2.9L	91	w193883
w194730	9.7L	8.4	55	19	4	.50	1.4	.70	6.3	76	w194730
w194731	7.7L	8.5	110	3.3	4	.80	1.4	.40	5.2	80	w194731
w194729	7.3L	6.0	49	9.9	3	.60	1.1	.50	6.4	92	w194729

Table 11h.--Major, minor, and trace element composition of 15 anthracite coal samples from Rhode Island and Massachusetts reported on whole-coal basis--continued

Sample number	Tb (ppm)	Th (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
w193926	0.1	3.0L	0.90	16	6.7	0.7	18	97	w193926
w193927	.5	3.0L	.20L	6.6	2.9	.3	9.1	21	w193927
w193928	.1	3.0L	.20	9.9	3.5	.4	15	13	w193928
w193929	.1	3.0L	.30	5.0	2.6	.2	9.4	11	w193929
w193930	.5L	3.0L	.20	8.9	3.5	.3	13	11	w193930
w198549	.3	3.0L	.30	11	5.1	.7	20	12	w198549
w198550	.6L	3.0L	.40	16	2.3	.6	26	9.1	w198550
w198551	.7L	3.0	.40	18	5.7	.5	29	14	w198551
w198552	.8L	3.0L	.60	33	7.4	.9	33	26	w198552
w198553	.7L	3.0L	.70	19	3.3	.8	26	17	w198553
w193881	.7	7.0	1.6	80	14	2.4	85	85	w193881
w193883	.7	7.0	1.5	66	13	2.3	70	91	w193883
w194730	.1	3.0L	.80	9.9	4.0	.3	27	19	w194730
w194731	.1	3.0L	.40	11	2.0	.2	30	15	w194731
w194729	.1	5.0	.50	7.8	2.2	.2	25	11	w194729

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