



ANALYSES OF COAL SAMPLES COLLECTED 1975-1977

James A. Henderson, Jr., Charles S. Oman, and S. Lynn Coleman



COMMONWEALTH OF VIRGINIA
DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT
DIVISION OF MINERAL RESOURCES

Robert C. Milici, Commissioner of Mineral Resources and State Geologist

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FRONT COVER: Channel sample in a 2.5-foot-thick coal bed in Russell County.



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ANAYLSES OF COAL SAMPLES COLLECTED 1975-1977

By

James A. Henderson, Jr.¹, Charles S. Oman², and S. Lynn Coleman²

ABSTRACT

In late 1975 the Virginia Division of Mineral Resources began a sampling program of coal beds in Virginia in cooperation with the U.S. Geological Survey and the U.S. Bureau of mines. A total of 134 samples were collected from coal beds of Pennsylvanian age in five of the seven counties in the Southwest Virginia coal field. Channel samples were collected at each of the sampling sites. In addition, supplemental samples of the roof- and floor-rock and major partings were collected at many sample sites, but were not analyzed. The samples are from most of the major coal beds in Southwest Virginia, and are from fresh exposures in active surface and underground mines.

Chemical analyses were made by the U.S. Bureau of Mines and the U.S. Geological Survey. The U.S. Bureau of Mines analyses include the proximate and ultimate analyses, forms of sulfur, heat value, fusibility of ash, and the free, swelling index. The U.S. Geological Survey analyses include the major-, minor-, and trace-element concentrations in both ash and whole coal. Statistical tables contain arithmetic and geometric means, observed range, and the standard deviation for samples collected in Virginia and are compared with samples in the National Coal Resources Data System for Tennessee, Kentucky and West Virginia.

INTRODUCTION

Coal has been mined in Virginia since colonial times. Initial production in the State was in the Richmond basin (Figure 1) and production of Triassic-age coal was reported there into the early part of the 20th century. Coal of Mississippian age was mined in the Valley coal fields (Figure 1) beginning in the late 1800's and continuing until 1971. Coal mining in the Pennsylvanian-age coals of the Southwest Virginia coal field began in the 1890's. The Southwest Virginia coal field (Figure 1) covers part or all of Buchanan, Dickenson, Lee, Russell, Scott, Tazewell, and Wise County.

Proximate, ultimate, heat content, and forms of sulfur analyses for some Virginia coals are available in reports published by the U.S. Bureau of Mines

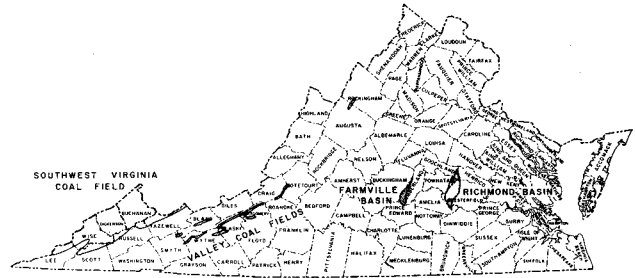


Figure 1. Index map of Virginia coal fields.

(U.S. Bureau of Mines, 1926; Eby and Campbell, 1944; and others). Preparation characteristics for Virginia coals have also been published by the U.S. Bureau of Mines (Gray and Boley, 1958A, 1958B; Deurbrouck, 1963A, 1963B; and others listed in the bibliography). Several reports are available on the chemical composition of coal ash (Abernathy, Peterson, and Gibson, 1969A, 1969B). Proximate and ultimate analyses, forms of sulfur, heat content, major, minor, and trace element values are presented in U.S. Geological Survey open-file reports (Swanson and others, 1976; Zubovic and others, 1979, 1980).

In 1975 the Virginia Division of Mineral Resources began a coal sampling and evaluation program in cooperation with the U.S. Geological Survey and the U.S. Bureau of Mines. Descriptions and analytical data for 134 samples collected by the principal author and other Division of Mineral Resources personnel in 1975, 1976, and 1977 are presented in this report. These samples are from most of the major coal beds in the Southwest Virginia coal field that were being mined during the time of the study. Data presented in this report and those by Zubovic and others (1979, 1980) are the latest and most detailed available for Virginia coals. General characteristics of the coal beds *should not* be inferred on the basis of this limited data base.

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¹Virginia Division of Mineral Resources

²U.S. Geological Survey

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SAMPLED AREA

The Southwest Virginia coal field is in the Appalachian Plateau physiographic province. Most of the coal occurs in the rocks of the Cumberland thrust sheet. The coal and associated rocks in the Southwest Virginia coal field are generally flat-lying to gently dipping except along the southeastern boundary of the Appalachian Plateau province (which is an arc of imbricated thrust sheets) and the northwestern edge of the Cumberland thrust sheet (which is bounded by the Pine Mountain fault). Other major structural features include the Russell Fork fault (a northwest-trending strike-slip fault), the Powell Valley anticline, and the Middlesboro syncline (Miller 1974, Figure 11). Geologic maps and reports on the coal-bearing counties in Southwest Virginia are listed in the bibliography. The coal beds occur in sequences composed of sandstone and shale and, rarely, in thin clastic and calcareous beds that are of marine origin.

Samples were collected for this report from five of the seven counties in the southwest field (Table 1; Figures 2-5). Numbers of the samples from the counties are: Wise (71); Buchanan (28); Dickenson (17); Russell (17); and Lee (1). The oldest coal sampled for this study is the lower Pennsylvanian Pocahontas No. 3 coal from the Pocahontas Formation in Buchanan County. The youngest coal sampled is the Middle Pennsylvanian High Splint coal from the Wise Formation in Wise County. Eighty-three of the samples are from the Wise Formation, 47 samples are from the Norton Formation, and 4 samples are from the Pocahontas Formation.

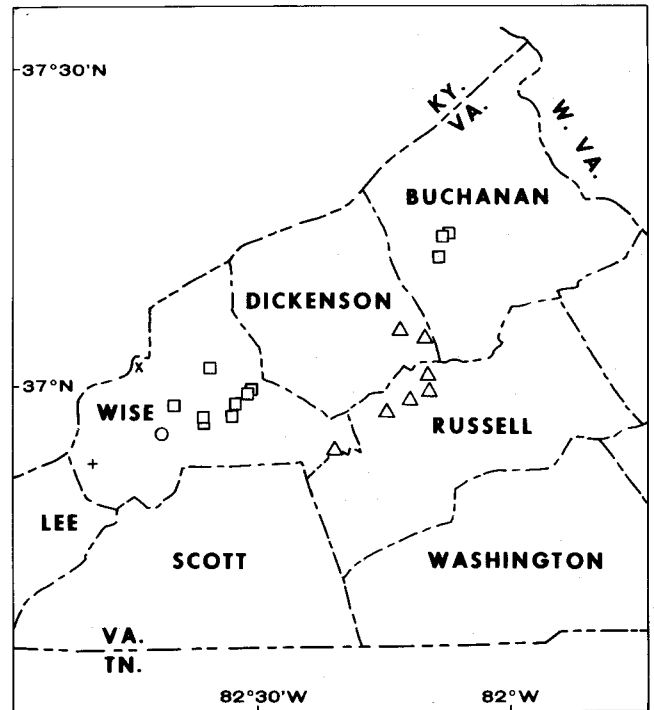


Figure 2. Location map for Dorchester (Glamorgan) (□), High Splint (X), Jawbone (△), Kelly (+), and Norton (○) coal beds.

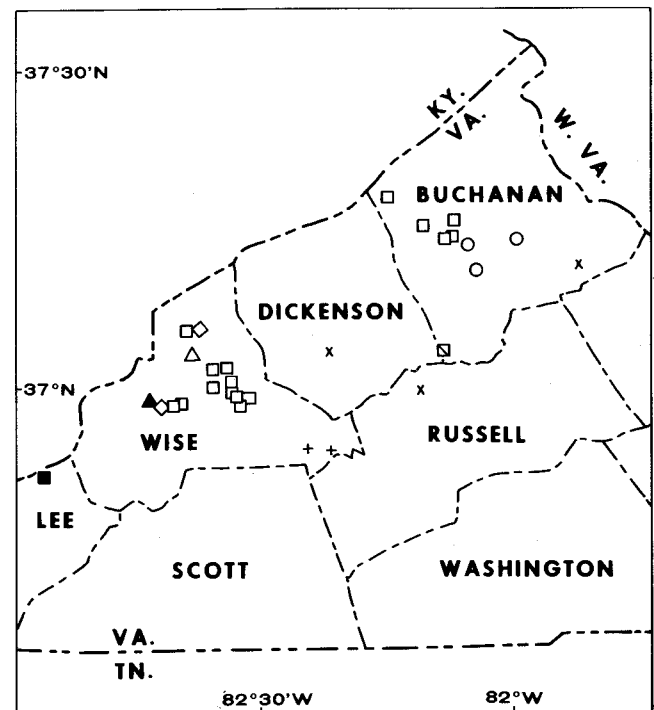


Figure 3. Location map for Blair (□), Imboden (◇), Jawbone-Tiller (▣), Kennedy (X), Low Splint (■), Lower Standiford (△), Pocahontas No. 3 (○), Raven (+), and Taggart (▲) coal beds.

SAMPLING PROCEDURES

All samples presented in this report are face-channel samples and were collected using procedures similar to those described by Schopf (1960) and Swanson and Huffman (1976). These sampling procedures are also similar to techniques used by Glass (1975) and Boreck and others (1977). Sampling sites were selected to give wide geographic and stratigraphic distribution. Coal freshness, geographic proximity to other samples, and the safety of the sampling area were used in deciding whether to accept or reject a sampling site. Each channel sample represents the entire thickness of coal and interbedded material being mined at each locality. Partings (shale laminae) that are mined with the coal were included in the sample. In places where partings were excluded from mining, a separate supplemental partings sample was taken; these samples were not analyzed, but are stored at the Division of Mineral Resources. Where the coal was being mined in benches, separate samples were taken from each coal interval. At sites where the coal thickness was greater than about 6 feet (2m), two samples were taken. In such cases, samples were collected on either side of major partings or textured breaks in coal.

A complete description of the coal and the associated roof- and floor-rocks was made at each sampling site. Coal descriptions based on field observations included thickness of the coal, thicknesses of subunits, accessory minerals, amount and type of observable macerals, and primary and secondary structures. Sampling site descriptions included site location, elevation of the coal bed, lithologies of rocks above and below the coal bed and strike and dip of the coal-bearing units. In many cases, supplemental samples were taken of the roof- and floor-rock.

Samples were taken using chisels of various lengths and widths and a hammer. Width and depth of the sample channels were adjusted to the thickness of the coal, but were sufficient to give a sample weight of approximately 20-25 lbs. (9-11kg.). Chiseled samples were collected on a canvas tarpaulin covered by polyethylene sheeting. The freshly cut sample was then crushed by hammers into pieces generally less than 3/4 inch (2 cm) in size, thoroughly mixed and divided into quarters. One quarter was placed in a U.S. Bureau of Mines coal can to be sent to the U.S. Geological Survey for for-

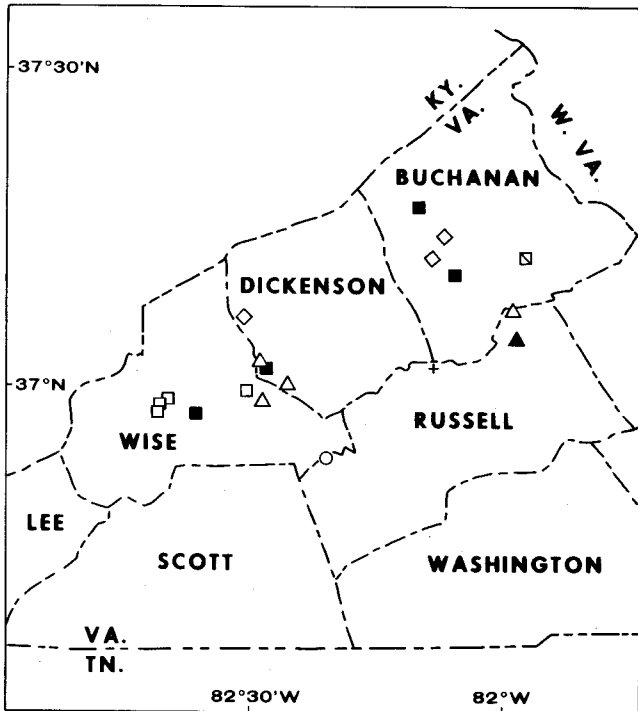


Figure 4. Location map for Aily (+), Big Fork (▲), Burton's Ford (○), Eagle (◇), Hagy (▣), Lyons (□), Splash Dam (■), and Upper Banner (△) coal beds.

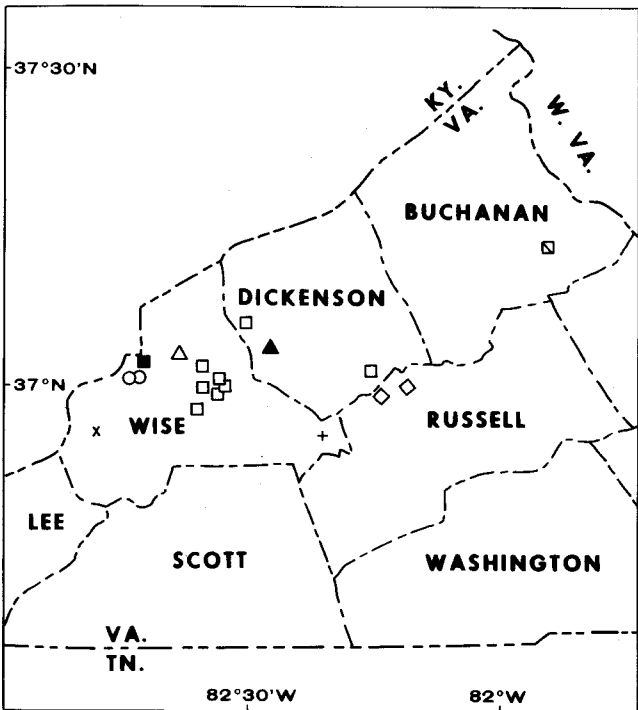


Figure 5. Location map for Cary (▣), Clintwood (□), Hog Wallow (+), House (■), Lower Banner (▲), Phillips (○), Taggart Marker (X), Tiller (◇), and Upper Standiford (△) coal beds.

warding to the U.S. Bureau of Mines laboratory; the other three quarters were bagged and sealed separately in double plastic bags. One of the quarters was retained by the Division as a contingency sample; the other two were sent to the U.S. Geological Survey for analysis.

CHEMICAL AND PHYSICAL TESTS

Analyses procedures used by the U.S. Bureau of Mines are described in *U.S. Bureau of Mines Bulletin 638* (1967). Determinations by the Bureau included proximate and ultimate analyses (see Table 2, this report, for parameters used in these tests), forms of sulfur, ash fusibility temperatures, heat values (BTU/lb) and free swelling index results.

The U.S. Geological Survey analyzed each sample for major, minor and trace elements. Procedures for these analyses as performed by the U.S. Geological Survey laboratory in Denver are described by Swanson and Huffman (1976). Analytical methods used at the U.S. Geological Survey in Reston are similar to those used in Denver and are outlined in Figure 6. Analyses are made on both the whole coal and coal ash. Whole coal determinations by wet chemical analysis are made for mercury (Hg) and fluorine (F); neutron activation is used for arsenic (As), cerium (Ce), cobalt (Co), chromium (Cr), cesium (Cs), europium (Eu), hafnium (Hf), lanthanum (La), lutetium (Lu), sodium (Na), rubidium (Rb), antimony (Sb), scandium (Sc), selenium (Se), samarium (Sm), terbium (Tb), and ytterbium (Yb); and delayed neutron activation is used for thorium (Th) and uranium (U). Determinations on coal ash are made

by wet chemical analysis techniques for cadmium (Cd), copper (Cu), lithium (Li), magnesium (Mg), manganese (Mn), lead (Pb), and zinc (Zn); emission spectrographic methods are used for silver (Ag), gold (Au) boron (B), barium (Ba), beryllium (Be), bismuth (Bi), dysprosium (Dy), erbium (Er), gallium (Ga), gadolinium (Gd), germanium (Ge), indium (In), iridium (Ir), molybdenum (Mo), niobium (Nb), neodymium (Nd), nickel (Ni), osmium (Os), palladium (Pd), praseodymium (Pr), platinum (Pt), rhenium (Re), rhodium (Rh), ruthenium (Ru), tin (Sn), strontium (Sr), tantalum (Ta), tellurium (Te), thallium (Tl), thulium (Tm), vanadium (V), tungsten (W), yttrium (Y), and zirconium (Zr); and X-ray fluorescence techniques for aluminum (Al), calcium (Ca), iron (Fe), potassium (K), phosphorous (P), silicon (Si), sulfur (S), and titanium (Ti).

RESULTS

Analytical results from the U.S. Bureau of Mines are in Table 2; results from analyses performed by the U.S. Geological Survey are in Tables 3, 4 and 5; statistical summaries for the 134 samples from Virginia are in Table 6. Statistical summaries from public data in the National Coal Resources Data System for the same chemical data on coal samples from Tennessee (55 samples), Kentucky (88 samples), and West Virginia (309 samples) are given in Tables 7, 8 and 9, respectively. Comparisons of the arithmetic means of Virginia samples using the *student t-test* at the 95 percent confidence level with those of the samples from Tennessee, Kentucky and West Virginia are given in Table 10.

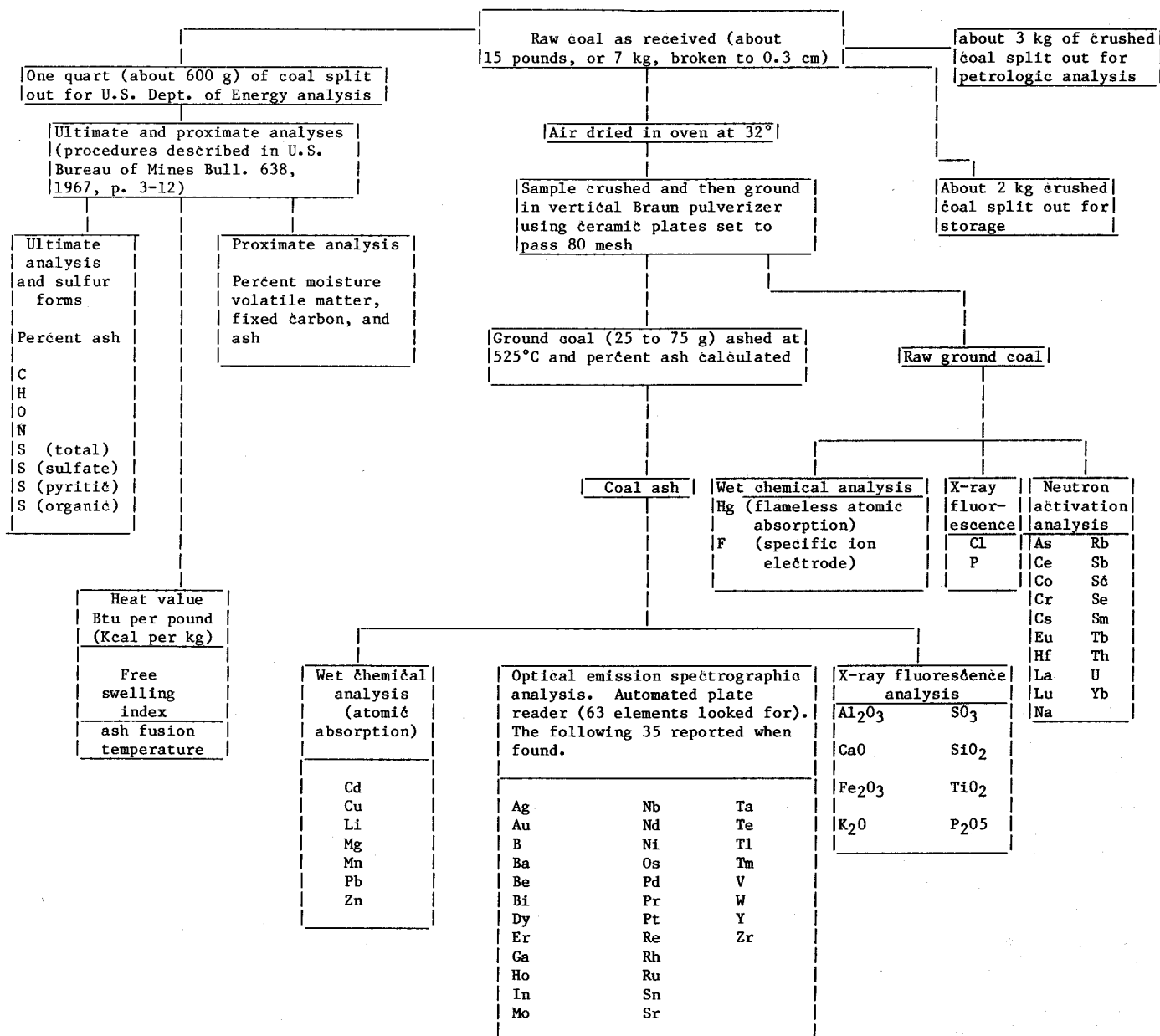


Figure 6. Flow chart of analyses performed on coal samples.

SELECTED BIBLIOGRAPHY

- Abernethy, R.F., Peterson, M.J. and Gibson, F.H., 1969A, Major ash constituents in U.S. coals: U.S. Bureau of Mines Rept. Inv. 7240, 9 p.
- Aberethy, R.F., Peterson, M.J. and Gibson, F.H., 1969B, Spectrochemical analyses of coal ash for trace elements: U.S. Bureau of Mines Rept. Inv. 7281, 30 p.
- American Society for Testing Materials, 1974, Annual book of ASTM standards, Part 26, Gaseous fuels; coal and coke; atmosphere analysis: Philadelphia, Pennsylvania, 828 p.
- Aresco, S.J. and Haller, C.P., 1953, Analyses of tipple and delivered samples of coal (collected during fiscal years 1951, 1952): U.S. Bureau of Mines Rept. Inv. 4934 (93 p.), 4972 (84 p.).
- Aresco, S.J., Haller, C.P. and Abernethy, R.F., 1955-1961, Analyses of tipple and delivered samples of coal (collected during the fiscal years 1953-1960): U.S. Bureau of Mines Rept. Inv. 5085 (82 p.), 5221 (77 p.), 5270 (66 p.), 5332 (67 p.), 5401 (59 p.), 5489 (54 p.), 5615 (59 p.), 5792, (44 p.).
- Aresco, S.J., Janus, J.B. and Walker, F.E., 1963, Analyses of tipple and delivered samples of coal (collected during the fiscal year 1962): U.S. Bureau of Mines Rept. Inv. 6300, 46 p.
- Boreck, D.L., Jones, D.C., Murray, D.K., Schultz, J.E. and Suek, D.C., 1977, Colorado coal analyses, 1975, (analyses of 64 samples collected in 1975): Colorado Geol. Survey, Inf. Ser. 7, 112 p.
- Brown, Andrew and others, 1952, Coal resources of Virginia: U.S. Geol. Survey Circ. 171, 57 p.
- Deurbrouck, A.W., 1963A, Preparation characteristics of coal from Tazewell County, Virginia: U.S. Bureau of Mines Inv. 6297, 31 p.
- Deurbrouck, A.W., 1963B, Preparation characteristics of coal from Russell County, Virginia: U.S. Bureau of Mines Rept. Inv. 6342 32 p.
- Eby, J.B., 1923, Geology and mineral resources of Wise County and the coal-bearing portion of Scott County, Virginia: Virginia Geol. Survey Bull. 24, 617 p.
- Eby, J.B. and Campbell, M.R., 1944, Analyses of Virginia coals, U.S. Bureau of Mines Tech. Paper 656, 159 p.
- Giles, A.W., 1921, Geology and coal resources of Dickenson County, Virginia: Virginia Geol. Survey Bull. 21, 224 p.
- _____ 1925, Geology and coal resources of the coal-bearing portion of Lee County, Virginia: Virginia Geol. Survey Bull. 26, 216 p.
- Glass, G.B., 1975, Analyses and measured sections of 54 Wyoming coal samples (collected in 1974): The Geological Survey of Wyoming, 219 p.
- Gray, T.E. and Boley, C.C., 1958A, Preparation characteristics of coal from Wise County, Virginia: U.S. Bureau of Mines Rept. of Inv. 5391, 50 p.
- Gray, T.E. and Boley, C.C., 1958B, Preparation characteristics of coal from Dickenson County, Virginia: U.S. Bureau of Mines Rept. of Inv. 5405, 31 p.
- Harnsberger, T.K., 1919, Geology and coal resources of the coal-bearing portion of Tazewell County, Virginia: Virginia Geol. Survey Bull. 19, 195 p.
- Hinds, Henry, 1916, Coal resources of the Clintwood and Bucu Quadrangles, Virginia: Virginia Geol. Survey Bull. 12, 206 p.
- _____ 1918, Geology and coal resources of Buchanan County, Virginia: Virginia Geol. Survey Bull. 18, 278 p.
- Miller, J.W., 1957, Preparation characteristics of coal from Lee County, Virginia: U.S. Bureau of Mines Rept. of Inv. 5358, 14 p.
- Miller, M.S., 1974, Stratigraphy and coal beds of upper Mississippian and lower Pennsylvanian rocks in southwestern Virginia: Virginian Division of Mineral Resources Bull. 84, 211 p.
- Miller, R.L., 1969, Pennsylvanian formations of Southwest Virginia: U.S. Geol. Survey Bull. 1280, 62 p.
- Schopf, J.M., 1960, Field description and sampling of coal beds: U.S. Geol. Survey Bull. 1111-B, p., 25-70.
- Swanson, V.E. and Huffman, Claude, Jr., 1976, Guidelines for sample collecting and analytical methods used in the U.S. Geological Survey for determining chemical composition of coal: U.S. Geol. Circ. 735, 11 p.
- Swanson, V.E., and others, 1976, Collection, chemical analysis, and evaluation of coal samples in 1975: U.S. Geol. Survey Open-File report 76-468, 503 p.
- U.S. Bureau of Mines, 1926, Analyses of Virginia coals: U.S. Bureau of Mines Tech. Paper 365, 75 p.
- U.S. Bureau of Mines, 1967, Methods of analyzing and testing coal and coke: U.S. Bureau of Mines Bull. 638, 85 p.
- Wentworth, C.K., 1922, Geology and coal resources of Russell County, Virginia: Virginia Geol. Survey Bull. 22, 179 p.
- Zubovic, Peter, and others, 1979, Chemical analysis of 617 coal samples from the Eastern United States: U.S. Geol. Survey Open-File report 79-665, 452 p.
- Zubovic, Peter and others, 1980, Chemical analysis of 659 coal samples from the eastern United States: U.S. Geol. Survey, Open-file Report 80-2003, 513 p.

Table 1. Sample and location information for samples for Pennsylvanian-age coals collected in 1975, 1976 and 1977.

Sample * Number	Coal Field Type of Exposure	Formation Age	Coal Bed** Measured Interval Thickness Sample Thickness
Buchanan County			
R-6876	Southwest Virginia Surface Mine	Norton Pennsylvanian	Splash Dam (Lower Bench) 16.13 + ft. (4.92 + m) 3.05 ft. or 36.5 in. (0.930 m)
R-6877	Southwest Virginia Surface Mine	Norton Pennsylvanian	Splash Dam (Upper Bench) 16.13 ft. (4.92 + m) 3.05 ft. or 36.5 in. (0.930 m)
R-6878	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair 32.41 + ft. (9.88 + m) 1.71 ft. or 20.5 in. (0.521 m)
R-6879	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair (Lower Bench) 72.09 + ft. (21.97 + m) 1.05 ft. or 12.25 in. (0.317 m)
R-6880	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair (Middle Bench) 72.09 + ft. (21.97 + m) 0.71 ft. or 8.5 in. (0.216 m)
R-6881	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair (Upper Bench) 72.09 + ft. (21.97 + m) 0.66 ft. or 8 in. (0.201 m)
R-6882	Southwest Virginia Underground Mine	Pocahontas Pennsylvanian	Pocahontas No. 3 6.1 + ft. (1.85 + m) 5.7 ft. or 68.5 in. (1.737 m)
R-6883	Southwest Virginia Underground Mine	Pocahontas Pennsylvanian	Pocahontas No. 3 6.12 + ft. (1.86 m) 5.42 ft. or 65 in. (1.652 m)

* Precise location data available from Virginia Division of Mineral Resources

** For stratigraphic sequence see Brown and others (1952, Plate 3).

Sample Number	Coal Field Type of Exposure	Formation Age	Coal Bed Measured Interval Thickness Sample Thickness
Buchanan County (cont.)			
R-6884	Southwest Virginia Underground Mine	Pocahontas Pennsylvanian	Pocahontas No. 3 5.11 + ft. (1.56 + m) 4.41 ft. or 53 in. (1.344 m)
R-6885	Southwest Virginia Surface Mine	Norton Pennsylvanian	Kennedy 43.55 + ft. (13.88 + m) 2.35 ft. or 28.25 in. (0.716 m)
R-6889	Southwest Virginia Surface Mine	Norton Pennsylvanian	Cary (Upper Bench) 66.19 + ft. (20.17 + m) 1.74 ft. or 21 in. (0.530 m)
R-6890	Southwest Virginia Surface Mine	Norton Pennsylvanian	Splash Dam (Lower Bench) 50.24 + ft. (15.31 + m) 1.07 ft. or 12.75 in. (0.326 m)
R-6891	Southwest Virginia Surface Mine	Norton Pennsylvanian	Splash Dam (Upper Bench) 50.24 + ft. (15.31 + m) 3.7 ft. or 44.5 in. (1.128 m)
R-6893	Southwest Virginia Surface Mine	Norton Pennsylvanian	Hagy 27.1 + ft. (8.26 + m) 3.7 ft. or 44.5 in. (0.579 m)
R-6894	Southwest Virginia Surface Mine	Wise Pennsylvanian	Eagle 45.64 + ft. (13.91 + m) 3.44 ft. or 41.25 in. (1.048 m)
R-6895	Southwest Virginia Surface Mine	Norton Pennsylvanian	Splash Dam 14.54 + ft. (4.43 + m) 0.94 ft. or 11.25 in. (0.286 m)
R-6896	Southwest Virginia Surface Mine	Wise Pennsylvanian	Glamorgan 61.67 + ft. (18.80 + m) 2.7 ft. or 32.5 in. (0.823 m)

Sample Number	Coal Field Type of Exposure	Formation Age	Coal Bed Measured Interval Thickness Sample Thickness
Buchanan County (cont.)			
R-6897	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair (Lower Bench) 7.85 + ft. (2.39 + m) 1.2 ft. or 14.5 in. (0.366 m)
R-6898	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair (Upper Bench) 2.92 + ft. (0.89 + m) 1.77 ft. or 21.25 in. (0.539 m)
R-6899	Southwest Virginia Surface Mine	Wise Pennsylvanian	Eagle 30.0 + ft. (9.14 + m) 2.64 ft. or 31.75 in. (0.805 m)
R-6900	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair (Lower Bench) 82.75 + (25.22 + m) 1.43 ft. or 17.25 in. (0.436 m)
R-6901	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair (Upper Bench) 82.75 + ft. (25.22 + m) 1.4 ft. or 17 in. (0.427 m)
R-6902	Southwest Virginia Surface Mine	Wise Pennsylvanian	Glamorgan 18.98 + ft. (5.78 m) 2.78 ft. or 33.25 in. (0.847 m)
R-6903	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair (Lower Bench) 76.38 + ft. (23.28 + m) 1.8 ft. or 21.5 in. (0.549 m)
R-6904	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair (Middle Bench) 76.38 + ft. (23.28 + m) 3.24 ft. or 39 in. (0.988 m)
R-6905	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair (Upper Bench) 76.38 + ft. (23.28 + m) 1.75 ft. or 21 in. (0.533 m)

Sample Number	Coal Field Type of Exposure	Formation Age	Coal Bed Measured Interval Thickness Sample Thickness
Buchanan County (cont.)			
R-6906	Southwest Virginia Surface Mine	Wise Pennsylvanian	Glamorgan (Lower Bench) 45.3 + ft. (13.81 + m) 1.2 ft. or 14.5 in. (0.366 m)
R-6907	Southwest Virginia Surface Mine	Wise Pennsylvanian	Glamorgan (Upper Bench) 45.3 + ft. (13.81 + m) 0.89 ft. or 10.75 in. (0.271 m)
Dickenson County			
R-6853	Southwest Virginia Surface Mine	Wise Pennsylvanian	Eagle 35.94 + ft. (10.95 + m) 2.69 ft. or 32.25 in. (0.819 m)
R-6854	Southwest Virginia Surface Mine	Wise Pennsylvanian	Clintwood (Lower Marker) 10.88 + ft. (3.32 + m) 1.54 ft. or 18.5 in. (0.470 m)
R-6857	Southwest Virginia Surface Mine	Wise Pennsylvanian	Clintwood (1 of 2) 39.93 + ft. (12.17 + m) 2.28 ft. or 27.25 in. (0.695 m)
R-6861	Southwest Virginia Surface Mine	Norton Pennsylvanian	Upper Banner (Lower Bench) 34.35 + ft. (10.47 + m) 4.3 ft. or 51.5 in. (1.311 m)
R-6862	Southwest Virginia Surface Mine	Norton Pennsylvanian	Upper Banner (Upper Bench) 34.35 + ft. (10.47 + m) 4.85 ft. or 58.25 in. (1.478 m)
R-6865	Southwest Virginia Surface Mine	Norton Pennsylvanian	Upper Banner (Lower Bench) 56.31 + ft. (17.16 + m) 1.95 ft. or 23.5 in. (0.594 m)
R-6866	Southwest Virginia Surface Mine	Norton Pennsylvanian	Upper Banner (Middle Bench) 56.31 + ft. (17.16 + m) 0.78 ft. or 9.25 in. (0.238 m)

Sample Number	Coal Field Type of Exposure	Formation Age	Coal Bed Measured Interval Thickness Sample Thickness
Dickenson County (cont.)			
R-6867	Southwest Virginia Surface Mine	Norton Pennsylvanian	Upper Banner (Upper Bench) 56.31 + ft. (17.16 + m) 0.7 ft. or 8.5 in. (0.213 m)
R-6873	Southwest Virginia Underground Mine	Norton Pennsylvanian	Jawbone-Tiller (Upper Bench) 16.42 + ft. (5.00 + m) 2.25 ft. or 27 in. (0.686 m)
R-6874	Southwest Virginia Surface Mine	Norton Pennsylvanian	Jawbone-Tiller (Middle Bench) 16.42 + ft. (5.00 + m) 2.8 ft. or 33.5 in. (0.853 m)
R-6875	Southwest Virginia Underground Mine	Norton Pennsylvanian	Jawbone-Tiller (Lower Bench) 16.42 + ft. (5.00 + m) 4.95 ft. or 59.5 in. (1.509 m)
R-6920	Southwest Virginia Surface Mine	Norton Pennsylvanian	Splash Dam 59.53 + ft. (18.14 + m) 1.53 ft. or 18 in. (0.466 m)
R-6922	Southwest Virginia Prospect Pit	Norton Pennsylvanian	Jawbone 4.65 + ft. (1.42 + m) 2.45 ft. or 29.5 in. (0.747 m)
R-6941	Southwest Virginia Surface Mine	Norton Pennsylvanian	Kennedy 45.05 + ft. (13.73 + m) 3.4 ft. or 41 in. (1.236 m)
R-6943	Southwest Virginia Underground Mine	Norton Pennsylvanian	Jawbone (Lower Bench) 8.62 + ft. (2.63 + m) 2.6 ft. or 31.25 in. (0.792 m)
R-6944	Southwest Virginia Underground Mine	Norton Pennsylvanian	Jawbone (Upper Bench) 8.62 + ft. (2.63 + m) 2.22 ft. or 26.5 in. (0.677 m)

Sample Number	Coal Field Type of Exposure	Formation Age	Coal Bed Measured Interval Thickness Sample Thickness
Dickenson County (cont.)			
R-7069	Southwest Virginia Underground Mine	Norton Pennsylvanian	Lower Banner 50.19 + ft. (15.3 + m) 2 ft. or 24 in. (0.610 m)
Lee County			
R-6923	Southwest Virginia Underground Mine	Wise Pennsylvanian	Taggart 38.38 + ft. (11.7 + m) 3.18 ft. or 38 in. (0.969 m)
Russell County			
R-6852	Southwest Virginia Surface Mine	Norton Pennsylvanian	Aily 38.21 + ft. (11.65 + m) 2.04 ft. or 24.5 in. (0.622 m)
R-6856	Southwest Virginia Surface Mine	Norton Pennsylvanian	Kennedy 23.48 + ft. (7.16 + m) 2 ft. or 24 in. (0.610 m)
R-6863	Southwest Virginia Underground Mine	Norton Pennsylvanian	Tiller 10.03 + ft. (3.06 + m) 4.25 ft. or 51 in. (1.295 m)
R-6864	Southwest Virginia Underground Mine	Norton Pennsylvanian	Jawbone 6.85 + ft. (2.09 + m) 6.45 ft. or 77.5 in. (1.966 m)
R-6869	Southwest Virginia Underground Mine	Norton Pennsylvanian	Jawbone 4.62 + ft. (1.41 + m) 4.12 ft. or 49.5 in. (1.256 m)
R-6870	Southwest Virginia Underground Mine	Norton Pennsylvanian	Jawbone 6.04 + ft. (1.84 + m) 3.34 ft. or 40 in. (1.018 m)
R-6886	Southwest Virginia Surface Mine	Norton Pennsylvanian	Big Fork 70.6 + ft. (21.52 + m) 2.4 ft. or 28.75 in. (0.732 m)

Sample Number	Coal Field Type of Exposure	Formation Age	Coal Bed Measured Interval Thickness Sample Thickness
Russell County (cont.)			
R-6887	Southwest Virginia Surface Mine	Norton Pennsylvanian	Upper Banner (Lower Bench) 47.05 + ft. (14.34 + m) 4.07 ft. or 48.75 in. (1.270 m)
R-6888	Southwest Virginia Surface Mine	Norton Pennsylvanian	Upper Banner (Upper Bench) 47.05 + ft. (14.34 + m) 0.75 ft. or 9 in. (0.229 m)
R-6917	Southwest Virginia Surface Mine	Norton Pennsylvanian	Jawbone (Bottom Bench) 58.41 + ft. (17.80 + m) 1.85 ft. or 22 in. (0.503 m)
R-6918	Southwest Virginia Surface Mine	Norton Pennsylvanian	Jawbone (Middle Bench) 58.41 + ft. (17.80 + m) 0.9 ft. or 11 in. (0.274 m)
R-6919	Southwest Virginia Surface Mine	Norton Pennsylvanian	Jawbone (Top Bench) 58.41 + (17.80 + m) 2.5 ft. or 30 in. (0.762 m)
R-6945	Southwest Virginia	Norton Pennsylvanian	Tiller 3.79 + ft. (1.16 + m) 3.05 ft. or 36.5 in. (0.930 m)
R-6946	Southwest Virginia Underground Mine	Norton Pennsylvanian	Tiller 5.45 + ft. (1.66 + m) 0.45 ft. or 5.4 in. (0.137 m)
R-6947	Southwest Virginia Underground Mine	Norton Pennsylvanian	Tiller 5.35 + ft. (1.63 + m) 0.75 ft. or 9 in. (0.229 m)
R-6948	Southwest Virginia Underground Mine	Norton Pennsylvanian	Tiller 3.9 ft. (1.19 + m) 3.1 ft. or 37.25 in. (0.945 m)

Sample Number	Coal Field Type of Exposure	Formation Age	Coal Bed Measured Interval Thickness Sample Thickness
Russell County (cont.)			
R-7161	Southwest Virginia Surface Mine	Pocahontas Pennsylvanian	Burtons Ford #3 25.7 + ft. (7.83 + m) 4.7 + ft. or 56.5 + in. (1.432 +)
Wise County			
R-6814	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester (2 of 5) 59.4 + ft. (18.10 + m) 2.12 ft. or 25.5 in. (0.646 m)
R-6815	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester (3 of 3) 32.01 + ft. (9.76 + m) 1.19 ft. or 14.5 in. (0.363 m)
R-6816	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester (Upper Bench) 36.92 + ft. (11.25 + m) 2.04 ft. or 24.5 in. (0.622 m)
R-6817	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester (Lower Bench) 36.92 + ft. (11.25 + m) 1.6 ft. or 19.25 in. (0.489 m)
R-6818	Southwest Virginia Surface Mine	Wise Pennsylvanian	Lyons 42.64 + ft. (13.00 + m) 2.43 or 29 in. (0.741 m)
R-6819	Southwest Virginia Surface Mine	Wise Pennsylvanian	Lyons 52.0 + ft. (15.85 + m) 1.83 ft. or 22 in. (0.559 m)
R-6820	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester (1 of 5) 4.69 + ft. (1.43 + m) 0.98 ft. or 11.75 in. (0.298 m)
R-6821	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair 24.14 + ft. (7.36 + m) 1.80 ft. or 21.5 in. (0.549 m)

Sample Number	Coal Field Type of Exposure	Formation Age	Coal Bed Measured Interval Thickness Sample Thickness
Wise County (cont.)			
R-6822	Southwest Virginia Surface Mine	Wise Pennsylvanian	Clintwood Marker ¹ 22.69 + ft. (6.92 + m) 1.35 ft. or 16.25 in. (0.413 m)
R-6823	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair Marker ¹ 39.77 + ft. (12.12 + m) 0.64 ft. or 7.75 in. (0.199 m)
R-6824	Southwest Virginia Surface Mine	Wise Pennsylvanian	Lyons 44.75 + ft. (13.64 + m) 2.33 ft. or 28 in. (0.711 m)
R-6825	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair 44.57 + ft. (13.58 + m) 2.25 ft. or 27 in. (0.686 m)
R-6826	Southwest Virginia Surface Mine	Wise Pennsylvanian	Lower Standiford 78.21 + ft. (23.84 + m) 2.71 ft. or 32.5 in. (0.825 m)
R-6827	Southwest Virginia Surface Mine	Wise Pennsylvanian	Upper Standiford 78.21 + ft. (23.84 + m) 3.33 ft. or 40 in. (1.016 m)
R-6828	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester (3 of 3) 11.9 + ft. (3.63 + m) 1.73 ft. or 20.75 in. (0.527 m)
R-6829	Southwest Virginia Surface Mine	Wise Pennsylvanian	Clintwood (3 of 3) 62.68 + ft. (19.10 + m) 1.42 ft. or 17 in. (0.432 m)
R-6830	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester (4 of 5) 51.22 + ft. (15.61 + m) 1.8 ft. or 21.5 in. (0.549 m)

Sample Number	Coal Field Type of Exposure	Formation Age	Coal Bed Measured Interval Thickness Sample Thickness
Wise County (cont.)			
R-6831	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester (3 of 5) 6.9 + ft. (2.10 + m) 0.88 ft. or 10.5 in. (0.267 m)
R-6832	Southwest Virginia Surface Mine	Norton Pennsylvanian	Upper Banner (Lower Bench) 49.1 + ft. (14.96 + m) 2.45 ft. or 29.5 in. (0.747 m)
R-6833	Southwest Virginia Surface Mine	Norton Pennsylvanian	Upper Banner (Upper Bench) 49.1 + ft. (14.96 + m) 2.14 ft. or 25.75 in. (0.652 m)
R-6834	Southwest Virginia Surface Mine	Wise Pennsylvanian	Clintwood 62.18 + ft. (18.95 + m) 3.14 ft. or 37.75 in. (0.959 m)
R-6835	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair 31.14 + ft. (9.49 + m) 2.27 ft. or 27.25 in. (0.692 m)
R-6836	Southwest Virginia Surface Mine	Wise Pennsylvanian	Clintwood (2 of 3) 13.07 + ft. (3.98 + m) 1.52 ft. or 18.25 in. (0.464 m)
R-6837	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester (1 of 3) Lower Bench 32.55 + ft. (9.92 + m) 0.83 ft. or 10 in. (0.254 m)
R-6838	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester (1 of 3) Lower Bench 32.55 + ft. (9.92 + m) 0.92 ft. or 11 in. (0.279 m)
R-6839	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair 22.12 ft. (6.74 + m) 3.27 ft. or 39.29 in. (0.997 m)

Sample Number	Coal Field Type of Exposure	Formation Age	Coal Bed Measured Interval Thickness Sample Thickness
Wise County (cont.)			
R-6840	Southwest Virginia Surface Mine	Wise Pennsylvanian	Clintwood 27.97 + ft. (8.52 + m) 1.49 ft. or 18 in. (0.454 m)
R-6841	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester (5 of 5) 45.54 + ft. (13.88 + m) 3.04 ft. or 36.5 in. (0.927 m)
R-6842	Southwest Virginia Surface Mine	Wise Pennsylvanian	Imboden 56.48 + ft. (17.22 + m) 2.31 ft. or 27.75 in. (0.705 m)
R-6844	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair Marker ¹ 34.55 + ft. (10.53 + m) 0.83 ft. or 10 in. (0.254 m)
R-6845	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair Marker ¹ 23.13 + ft. (7.05 + m) 2.96 ft. or 35.5 in. (0.902 m)
R-6846	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester 24.17 + ft. (7.37 + m) 2.79 ft. or 33.5 in. (0.851 m)
R-6847	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester (2 of 3) Lower Bench 3.93 + ft. (1.20 + m) 0.46 ft. or 5.5 in. (0.140 m)
R-6848	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester (2 of 3) Upper Bench 3.13 + ft. (1.20 + m) 1.93 ft. or 23 in. (0.588 m)
R-6849	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester (3 of 3) 30.13 + ft. (9.18 + m) 1.88 ft. or 22.5 in. (0.572 m)
R-6850	Southwest Virginia Surface Mine	Norton Pennsylvanian	Jawbone Rider ¹ 38.6 + ft. (11.76 + m) 1.26 ft. or 15.25 in. (0.384 m)

Sample Number	Coal Field Type of Exposure	Formation Age	Coal Bed Measured Interval Thickness Sample Thickness
Wise County (cont.)			
R-6851	Southwest Virginia Surface Mine	Wise Pennsylvanian	Clintwood (1 of 3) 19.75 + ft. (6.02 + m) 1.38 ft. or 16.5 in. (0.419 m)
R-6855	Southwest Virginia Surface Mine	Wise Pennsylvanian	Clintwood (2 of 3) 29.58 + ft. (9.02 + m) 0.91 ft. or 11 in. (0.277 m)
R-6858	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair Marker ¹ 27.67 + ft. (8.43 + m) 1.5 ft. or 18 in. (0.457 m)
R-6859	Southwest Virginia Surface Mine	Wise Pennsylvanian	Clintwood (1 of 3) Lower Bench 4.35 + ft. (1.32 + m) 0.86 ft. or 10.25 in. (0.262 m)
R-6860	Southwest Virginia Surface Mine	Wise Pennsylvanian	Clintwood (1 of 3) Upper Bench (4.35 + ft. (1.32 + m) 1.69 ft. or 20.25 in. (0.515 m)
R-6868	Southwest Virginia Surface Mine	Norton Pennsylvanian	Hog Wallow 45.51 + ft. (13.87 + m) 1.71 ft. or 20.5 in. (0.521 m)
R-6871	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair 25.88 + ft. (7.89 + m) 1.68 ft. or 20 inc. (0.512 m)
R-6872	Southwest Virginia Surface Mine	Norton Pennsylvanian	Jawbone 33.54 + ft. (10.22 + m) 3.54 ft. or 42.5 in. (1.079 m)
R-6908	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester 55.58 + ft. (16.94 + m) 1.58 ft. or 19 in. (0.482 m)
R-6909	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair 47.4 + ft. (14.45 + m) 2.7 ft. or 32 in. (0.823 m)

Sample Number	Coal Field Type of Exposure	Formation Age	Coal Bed Measured Interval Thickness Sample Thickness
Wise County (cont.)			
R-6910	Southwest Virginia Surface Mine	Wise Pennsylvanian	Clintwood (Bottom Bench) 65.82 + ft. (20.06 + m) 1.72 ft. or 20.5 in. (0.524 m)
R-6911	Southwest Virginia Surface Mine	Wise Pennsylvanian	Kelly 29.4 + ft. (8.96 + m) 3.4 ft. or 41 in. (1.036 m)
R-6912	Southwest Virginia Surface Mine	Wise Pennsylvanian	Taggart Marker 38.45 + ft. (11.72 + m) 3.3 ft. or 39.5 in. (1.006 m)
R-6913	Southwest Virginia Surface Mine	Wise Pennsylvanian	Low Splint (Middle Bench) 57.7 + ft. (17.59 + m) 4.19 ft. or 50 in. (1.277 m)
R-6914	Southwest Virginia Surface Mine	Wise Pennsylvanian	High Splint 46.45 + ft. (14.16 + m) 3.76 ft. or 45 in. (1.146 m)
R-6915	Southwest Virginia Surface Mine	Wise Pennsylvanian	Phillips Marker ¹ 36.2 + ft. (11.03 + m) 1.3 ft. or 15.5 in. (0.396 m)
R-6916	Southwest Virginia Surface Mine	Wise Pennsylvanian	Phillips 55.04 + ft. (16.78 + m) 3.65 ft. or 44 in. (1.112 m)
R-6934	Southwest Virginia Surface Mine	Wise Pennsylvanian	Clintwood (Upper Bench) 61.35 + ft. (18.70 + m) 1.15 ft. or 14 in. (0.350 m)
R-6935	Southwest Virginia Surface Mine	Wise Pennsylvanian	Lyons 48.4 + ft. (14.75 + m) 2.2 ft. or 26 in. (0.670 m)

Sample Number	Coal Field Type of Exposure	Formation Age	Coal Bed Measure Interval Thickness Sample Thickness
Wise County (cont.)			
R-6936	Southwest Virginia Surface Mine	Wise Pennsylvanian	Imboden (Lower Bench) 42.15 + ft. (1285 + m) 1.77 ft. or 21.25 in. (0.539 m)
R-6937	Southwest Virginia Surface Mine	Wise Pennsylvanian	Imboden (Middle Bench) 42.15 + ft. (12.85 + m) 0.86 ft. or 10.25 in. (0.262 m)
R-6938	Southwest Virginia Surface Mine	Wise Pennsylvanian	Imboden (Upper Bench) 42.15 + ft. (12.85 + m) 0.85 ft. or 10.25 in. (0.259 m)
R-6939	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair 50.4 + ft. (15.36 + m) 3.7 ft. or 44.5 in. (1.128 m)
R-6940	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester (Lower Bench) 65.97 + ft. (20.11 + m) 1.93 ft. or 23.25 in. (0.588 m)
R-7068	Southwest Virginia Surface Mine	Norton Pennsylvanian	Norton 38.42 + ft. (11.71 + m) 3.22 ft. or 38.5 in. (0.981 m)
R-7070	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair 48.09 + ft. (14.66 + m) 1.89 ft. or 22.5 in. (0.576 m)
R-7071	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair 75.9 + ft. (23.13 + m) 2.68 ft. or 32 in. (0.817 m)
R-7072	Southwest Virginia Surface Mine	Norton Pennsylvanian	Raven (Lower Bench) 48.28 + ft. (14.72 + m) 1.61 ft. or 19.25 in. (0.491 m)

Sample Number	Coal Field Type of Exposure	Formation Age	Coal Bed Measured Interval Thickness Sample Thickness
Wise County (cont).			
R-7073	Southwest Virginia Surface Mine	Norton Pennsylvanian	Raven (Upper Bench) 48.28 + ft. (14.72 + m) 2.7 ft. or 32.5 in. (0.823 m)
R-7160	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester (Top Bench) 69.67 + ft. (21.24 + m) 1.47 ft. or 17.75 in. (0.448 m)
R-7168	Southwest Virginia Surface Mine	Wise Pennsylvanian	Clintwood 31.8 + ft. (9.69 + m) 2.6 ft. or 31.25 in. (0.792 m)
R-7169	Southwest Virginia Surface Mine	Wise Pennsylvanian	Blair Marker ¹ 34.81 + ft. (10.61 + m) 1.26 ft. or 15 in. (0.384 m)
R-7171	Southwest Virginia Surface Mine	Norton Pennsylvanian	Splash Dam (Lower Bench) 29.55 + ft. (9.01 + m) 1.35 ft. or 16.25 in. (0.411 m)
R-7174	Southwest Virginia Surface Mine	Wise Pennsylvanian	House (Upper Bench) 54.84 + ft. (16.72 + m) 1.58 ft. or 19 in. (0.482 m)
R-7175	Southwest Virginia Surface Mine	Wise Pennsylvanian	Dorchester (Lower Bench) 23.1 + ft. (7.04 + m) 2.10 ft. or 25.25 in. (0.640 m)

¹The terms "Marker" and "Rider" are used locally. These local names were not used in compiling Figures 2-5.

VIRGINIA DIVISION OF MINERAL RESOURCES

Table 2a.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 28 bituminous coal samples from Buchanan County, 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.]

Sample number	Proximate Analysis						Ultimate Analysis						Heat of Combustion	
	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb			
R-6876	3.6	28.1	59.6	8.7	5.2	75.9	1.5	7.3	1.4	7,520	13,530			
	---	29.1	61.8	9.0	5.0	78.7	1.6	4.3	1.5	7,800	14,040			
	---	32.0	68.0	---	5.5	86.5	1.7	4.7	1.6	8,570	15,430			
R-6877	1.9	35.2	50.6	12.3	5.0	72.2	1.4	5.4	3.9	7,290	13,120			
	---	35.9	51.6	12.5	4.9	73.6	1.4	3.8	4.0	7,430	13,370			
	---	41.0	59.0	---	5.6	84.1	1.6	4.3	4.5	8,490	15,290			
R-6878	1.8	25.7	58.7	13.8	4.6	73.8	1.5	5.4	.9	7,270	13,090			
	---	26.2	59.8	14.1	4.5	75.2	1.5	3.9	.9	7,400	13,330			
	---	30.5	69.5	---	5.2	87.4	1.8	4.5	1.1	8,610	15,500			
R-6879	2.5	31.0	59.8	6.7	5.3	78.6	1.4	6.4	1.5	7,790	14,030			
	---	31.8	61.3	6.9	5.2	80.6	1.4	4.3	1.5	7,990	14,390			
	---	34.1	65.9	---	5.5	86.6	1.5	4.6	1.7	8,580	15,450			
R-6880	1.7	33.6	62.3	2.4	5.5	83.2	1.7	6.1	1.2	8,280	14,910			
	---	34.2	63.4	2.4	5.4	84.6	1.7	4.7	1.2	8,430	15,170			
	---	35.0	65.0	---	5.5	86.8	1.8	4.8	1.3	8,640	15,550			
R-6881	1.7	32.0	61.4	4.9	5.1	79.7	1.4	5.4	3.4	7,990	14,380			
	---	32.6	62.5	5.0	5.0	81.1	1.4	4.0	3.5	8,130	14,630			
	---	34.3	65.7	---	5.3	85.3	1.5	4.2	3.6	8,550	15,400			
R-6882	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			
R-6883	.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			
R-6884	.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			
R-6885	2.7	25.0	69.0	3.3	5.1	83.4	1.4	6.1	.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			
R-6889	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			

Table 2a.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 28 bituminous coal samples from Buchanan County, Virginia--continued

Sample number	Forms of sulfur				Ash fusion temperature C			
	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
R-6876	2.6	0.22	0.53	0.62	8.5	1,350	1,420	1,480
	---	.23	.55	.64				
	---	.25	.60	.71				
R-6877	1.0	.01	2.59	1.26	8.5	1,125	1,170	1,230
	---	.01	2.64	1.28				
	---	.01	3.02	1.47				
R-6878	1.0	.07	.19	.59	9.0	1,430	1,490	1,540
	---	.07	.19	.60				
	---	.08	.23	.70				
R-6879	1.5	.06	.68	.73	9.0	1,285	1,340	1,400
	---	.06	.70	.75				
	---	.07	.75	.80				
R-6880	.8	.01	.31	.87	9.0	1,235	1,280	1,350
	---	.01	.32	.89				
	---	.01	.32	.91				
R-6881	.8	.10	2.66	.66	.0	1,320	1,375	1,430
	---	.10	2.71	.67				
	---	.11	2.85	.71				
R-6882	.7	.01	.26	.60	4.5	1,495	1,540	1,540
	---	.01	.26	.61				
	---	.01	.31	.72				
R-6883	.4	.01	.38	.47	6.5	1,210	1,265	1,315
	---	.01	.38	.47				
	---	.01	.44	.54				
R-6884	.5	.01	.19	.45	3.5	1,285	1,330	1,370
	---	.01	.19	.45				
	---	.01	.21	.49				
R-6885	1.8	.00	.06	.58	9.0	1,245	1,290	1,340
	---	.00	.06	.60				
	---	.00	.06	.62				
R-6889	3.7	.02	.26	.76	9.0	1,050	1,100	1,165
	---	.02	.27	.80				
	---	.02	.28	.82				

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Table 2a.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 28 bituminous coal samples from Buchanan County, Virginia--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	
R-6890	3.6	23.5	63.5	9.4	4.8	77.5	1.4	6.3	0.6	7,590	13,670	
	---	24.0	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	
R-6891	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	
R-6893	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	
R-6894	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	
R-6895	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	
R-6896	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	
R-6897	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	
R-6898	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	
R-6899	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	
R-6900	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	
R-6901	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	
R-6902	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	

Table 2a.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 28 bituminous coal samples from Buchanan County, Virginia--continued

Sample number	Forms of sulfur				Ash fusion temperature C		
	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften. fluid
R-6890	2.7	0.02	0.17	0.45	9.0	1,520	1,540 1,540
	---	.02	.18	.47			
	---	.02	.20	.52			
R-6891	5.8	.03	.40	.76	9.0	1,295	1,365 1,430
	---	.03	.43	.82			
	---	.04	.49	.93			
R-6893	4.9	.24	.65	.57	8.5	1,300	1,345 1,400
	---	.26	.69	.61			
	---	.30	.82	.72			
R-6894	3.4	.01	.06	.68	9.0	1,540	1,540 1,540
	---	.01	.06	.71			
	---	.01	.07	.76			
R-6895	2.3	.02	.71	.91	9.0	1,270	1,325 1,390
	---	.02	.73	.94			
	---	.02	.79	1.01			
R-6896	1.0	.02	.29	.87	9.0	1,175	1,225 1,290
	---	.02	.30	.89			
	---	.02	.30	.91			
R-6897	1.6	.02	.15	.56	6.5	1,540	1,540 1,540
	---	.02	.15	.57			
	---	.03	.19	.72			
R-6898	1.7	.09	.41	.73	9.0	1,395	1,450 1,510
	---	.09	.42	.75			
	---	.10	.46	.82			
R-6899	1.0	.01	.19	.65	9.0	1,185	1,235 1,290
	---	.01	.19	.67			
	---	.01	.20	.69			
R-6900	1.0	.02	.49	.50	8.0	1,540	1,540 1,540
	---	.02	.50	.51			
	---	.02	.60	.62			
R-6901	3.4	.15	.49	.52	9.0	1,520	1,540 1,540
	---	.16	.52	.55			
	---	.20	.65	.69			
R-6902	2.8	.02	.76	.53	8.5	1,375	1,435 1,500
	---	.02	.79	.55			
	---	.03	1.18	.83			

Table 2a.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 28 bituminous coal samples from Buchanan County, Virginia--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	
R-6903	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	
R-6904	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	
R-6905	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	
R-6906	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	
R-6907	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	

Table 2a.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 28 bituminous coal samples from Buchanan County, Virginia--continued

Sample number	Forms of sulfur				Ash fusion temperature C		
	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform. soften.	fluid
R-6903	2.2	0.01	0.66	0.65	8.5	1,130	1,245
	---	.01	.68	.67			
	---	.01	.73	.72			
R-6904	1.4	.01	.38	.58	8.5	1,540	1,540
	---	.01	.39	.59			
	---	.01	.47	.71			
R-6905	3.8	.01	.56	.48	8.0	1,540	1,540
	---	.01	.59	.50			
	---	.01	.64	.55			
R-6906	1.5	.01	.28	.57	9.0	1,490	1,540
	---	.01	.29	.58			
	---	.01	.30	.62			
R-6907	1.5	.01	.12	.50	8.0	1,540	1,540
	---	.01	.12	.51			
	---	.01	.16	.65			

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Table 2b.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 17 bituminous coal samples from Dickenson county, 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.]

Sample number	Proximate Analysis						Ultimate Analysis						Heat of Combustion	
	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb			
R-6853	2.3	33.4	59.6	4.7	5.5	79.1	1.5	6.4	2.8	7,930	14,270			
	---	34.2	61.0	4.8	5.4	81.0	1.5	4.5	2.9	8,110	14,610			
	---	35.9	64.1	---	5.6	85.1	1.6	4.7	3.0	8,520	15,340			
R-6854	3.0	31.6	63.1	2.3	5.5	81.8	1.6	7.8	1.0	8,110	14,590			
	---	32.6	65.1	2.4	5.3	84.3	1.6	5.3	1.0	8,360	15,040			
	---	33.4	66.6	---	5.5	86.4	1.7	5.4	1.1	8,560	15,410			
R-6857	2.7	32.8	61.3	3.2	5.6	79.9	1.5	8.7	1.1	7,950	14,310			
	---	33.7	63.0	3.3	5.4	82.1	1.5	6.5	1.1	8,170	14,710			
	---	34.9	65.1	---	5.6	84.9	1.6	6.7	1.2	8,450	15,210			
R-6861	2.0	29.1	55.8	13.1	4.9	73.6	1.6	6.3	.6	7,280	13,100			
	---	29.7	56.9	13.4	4.8	75.1	1.6	4.6	.6	7,420	13,360			
	---	34.3	65.7	---	5.5	86.7	1.9	5.3	.7	8,570	15,430			
R-6862	2.4	25.4	48.3	23.9	4.4	63.0	1.4	6.6	.7	6,190	11,150			
	---	26.0	49.5	24.5	4.2	64.5	1.4	4.6	.7	6,350	11,420			
	---	34.5	65.5	---	5.6	85.5	1.9	6.1	.9	8,400	15,120			
R-6865	2.8	25.9	62.8	8.5	5.0	77.9	1.5	6.4	.8	7,670	13,810			
	---	26.6	64.6	8.7	4.8	80.1	1.5	4.0	.8	7,890	14,210			
	---	29.2	70.8	---	5.3	87.8	1.7	4.4	.9	8,650	15,570			
R-6866	2.6	28.0	61.8	7.6	5.2	78.2	1.6	6.2	1.2	7,770	13,980			
	---	28.7	63.4	7.8	5.0	80.3	1.6	4.0	1.2	7,980	14,360			
	---	31.2	68.8	---	5.5	87.1	1.8	4.3	1.3	8,650	15,570			
R-6867	2.0	30.0	64.3	3.7	5.3	82.6	1.8	5.8	.9	8,210	14,770			
	---	30.6	65.6	3.8	5.2	84.3	1.8	4.1	.9	8,370	15,070			
	---	31.8	68.2	---	5.4	87.6	1.9	4.3	1.0	8,700	15,660			
R-6873	3.3	25.6	55.7	15.4	4.6	70.7	1.2	7.2	.8	6,950	12,510			
	---	26.5	57.6	15.9	4.4	73.1	1.2	4.4	.8	7,190	12,940			
	---	31.5	68.5	---	5.2	87.0	1.5	5.2	1.0	8,550	15,390			
R-6874	1.7	23.2	45.8	29.3	4.0	59.1	1.0	6.1	.6	5,770	10,390			
	---	23.6	46.6	29.8	3.9	60.1	1.0	4.7	.6	5,870	10,570			
	---	33.6	66.4	---	5.5	85.7	1.4	6.7	.9	8,360	15,060			
R-6875	1.9	26.4	58.7	13.0	4.7	75.4	1.3	5.2	.5	7,340	13,220			
	---	26.9	59.8	13.3	4.6	76.9	1.3	3.6	.5	7,480	13,470			
	---	31.0	69.0	---	5.3	88.6	1.5	4.1	.6	8,630	15,530			

Table 2b.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 17 bituminous coal samples from Dickenson county, Virginia--continued

Sample number	Forms of sulfur				Ash fusion temperature C			
	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
R-6853	0.0	0.02	2.02	0.71	9.0	1,095	1,155	1,190
	---	.02	2.07	.73				
	---	.02	2.17	.76				
R-6854	.0	.02	.26	.76	9.0	1,350	1,415	1,480
	---	.02	.27	.78				
	---	.02	.27	.80				
R-6857	.0	.02	.67	.42	9.0	1,100	1,230	1,325
	---	.02	.69	.43				
	---	.02	.71	.45				
R-6861	1.0	.00	.10	.50	7.5	1,450	1,515	1,540
	---	.00	.10	.51				
	---	.00	.12	.59				
R-6862	1.2	.00	.10	.60	9.0	1,290	1,365	1,390
	---	.00	.10	.61				
	---	.00	.14	.81				
R-6865	2.1	.00	.20	.50	7.5	1,540	1,540	1,540
	---	.00	.21	.51				
	---	.00	.23	.56				
R-6866	1.7	.00	.40	.70	9.0	1,385	1,460	1,525
	---	.00	.41	.72				
	---	.00	.45	.78				
R-6867	1.3	.00	.20	.70	9.0	1,345	1,395	1,435
	---	.00	.20	.71				
	---	.00	.21	.74				
R-6873	2.6	.01	.17	.65	8.5	1,375	1,440	1,500
	---	.01	.18	.67				
	---	.01	.21	.80				
R-6874	1.0	.01	.03	.51	5.5	1,520	1,540	1,540
	---	.01	.03	.52				
	---	.01	.04	.74				
R-6875	1.4	.00	.05	.44	8.5	1,215	1,260	1,305
	---	.00	.05	.45				
	---	.00	.06	.52				

Table 2b.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 17 bituminous coal samples from Dickenson county, Virginia--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	
R-6920	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	
R-6922	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	
R-6941	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	
R-6943	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	
R-6944	4.1	29.2	59.8	6.9	5.2	78.4	1.5	7.3	.7	7,680	13,830	
	---	30.4	62.4	7.2	4.9	81.8	1.6	3.8	.7	8,010	14,420	
	---	32.8	67.2	---	5.3	88.1	1.7	4.1	.8	8,630	15,540	
R-7069	2.2	16.5	32.7	48.6	2.8	41.8	.8	5.7	.4	3,960	7,120	
	---	16.9	33.4	49.7	2.6	42.7	.8	3.8	.4	4,050	7,280	
	---	33.5	66.5	---	5.2	85.0	1.6	7.6	.8	8,040	14,470	

Table 2b.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 17 bituminous coal samples from Dickenson county, Virginia--continued

Sample number	Forms of sulfur				Ash fusion temperature C			
	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform. soften.	fluid	
R-6920	3.4	0.01	0.30	0.71	9.0	1,180	1,235	1,290
	---	.01	.31	.74				
	---	.01	.33	.78				
R-6922	1.5	.01	.36	.43	8.0	1,540	1,540	1,540
	---	.01	.37	.44				
	---	.02	.54	.65				
R-6941	.8	.01	.19	.45	9.0	1,380	1,435	1,515
	---	.01	.19	.46				
	---	.01	.23	.55				
R-6943	1.6	.01	.07	.64	9.0	1,260	1,290	1,390
	---	.01	.07	.66				
	---	.01	.08	.73				
R-6944	3.5	.02	.11	.60	7.0	1,525	1,600	1,600
	---	.02	.11	.63				
	---	.02	.12	.67				
R-7069	1.1	.00	.04	.34	2.0	1,520	1,550	1,600
	---	.00	.04	.35				
	---	.00	.08	.69				

Table 2c.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 1 bituminous coal sample from Lee County, 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.]

Sample number	Proximate Analysis					Ultimate Analysis					Heat of Combustion	
	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb	
R-6923	3.4	36.0	56.0	4.6	5.6	77.8	1.5	10.0	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	

Table 2c.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 1 bituminous coal sample from Lee County, Virginia--continued

Sample number	Forms of sulfur				Ash fusion temperature C		
	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften. fluid
R-6923	1.2	0.00	0.04	0.54	6.0	1,395	1,455
---	---	.00	.04	.56			1,515
---	---	.00	.04	.59			

Table 2d.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 17 bituminous coal samples from Russell County, 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.]

Sample number	Proximate Analysis					Ultimate Analysis					Heat of Combustion	
	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb	
R-6852	4.6	27.3	59.6	8.5	5.1	74.6	1.2	9.9	0.7	7,300	13,140	
	---	28.6	62.5	8.9	4.8	78.2	1.3	6.1	.7	7,650	13,770	
	---	31.4	68.6	---	5.3	85.8	1.4	6.7	.8	8,400	15,120	
R-6856	2.4	27.9	50.4	19.3	4.8	67.2	1.4	6.5	.8	6,650	11,970	
	---	28.6	51.6	19.8	4.6	68.9	1.4	4.5	.8	6,810	12,260	
	---	35.6	64.4	---	5.8	85.8	1.8	5.6	1.0	8,490	15,290	
R-6863	1.8	29.2	56.8	12.2	4.9	75.2	1.3	5.8	.6	7,370	13,260	
	---	29.7	57.8	12.4	4.8	76.6	1.3	4.3	.6	7,500	13,510	
	---	34.0	66.0	---	5.5	87.4	1.5	4.9	.7	8,570	15,420	
R-6864	2.6	22.6	45.2	29.6	4.0	58.2	1.2	6.5	.5	5,660	10,190	
	---	23.2	46.4	30.4	3.8	59.8	1.2	4.3	.5	5,810	10,470	
	---	33.3	66.7	---	5.5	85.8	1.8	6.2	.7	8,350	15,040	
R-6869	1.2	31.3	53.7	13.8	4.7	72.7	1.4	6.8	.6	7,140	12,850	
	---	31.7	54.4	14.0	4.6	73.6	1.4	5.8	.6	7,220	13,000	
	---	36.8	63.2	---	5.4	85.5	1.6	6.7	.7	8,400	15,110	
R-6870	1.6	28.1	54.2	16.1	4.6	71.3	1.3	6.1	.6	6,950	12,500	
	---	28.6	55.1	16.4	4.5	72.5	1.3	4.8	.6	7,060	12,710	
	---	34.1	65.9	---	5.4	86.6	1.6	5.7	.7	8,440	15,190	
R-6886	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	
R-6887	2.5	31.9	58.7	6.9	5.3	79.2	1.5	6.4	.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	
R-6888	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	
R-6917	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	
R-6918	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 2d.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 17 bituminous coal samples from Russell County, Virginia--continued

Sample number	Forms of sulfur				Ash fusion temperature C		
	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften. fluid
R-6852	0.0	0.02	0.66	0.03	8.0	1,320	1,380 1,440
	---	.02	.69	.03			
	---	.02	.76	.03			
R-6856	.0	.02	.48	.28	8.0	1,305	1,375 1,445
	---	.02	.49	.29			
	---	.03	.61	.36			
R-6863	.9	.00	.00	.50	.0	1,265	1,305 1,325
	---	.00	.00	.51			
	---	.00	.00	.58			
R-6864	1.7	.00	.10	.30	5.0	1,490	1,525 1,540
	---	.00	.10	.31			
	---	.00	.15	.44			
R-6869	.4	.00	.00	.50	5.0	1,215	1,285 1,320
	---	.00	.00	.51			
	---	.00	.00	.59			
R-6870	.9	.00	.00	.50	6.5	1,325	1,400 1,430
	---	.00	.00	.51			
	---	.00	.00	.61			
R-6886	2.1	.03	.89	.66	5.5	1,400	1,450 1,490
	---	.03	.92	.68			
	---	.04	1.09	.81			
R-6887	1.5	.02	.17	.53	9.0	1,420	1,480 1,540
	---	.02	.17	.54			
	---	.02	.19	.58			
R-6888	1.6	.03	.33	.63	9.0	1,380	1,435 1,490
	---	.03	.34	.65			
	---	.03	.37	.70			
R-6917	1.5	.01	.35	.63	.0	1,515	1,540 1,540
	---	.01	.36	.64			
	---	.01	.43	.78			
R-6918	1.8	.01	.08	.30	1.0	1,330	1,380 1,435
	---	.01	.08	.31			
	---	.02	.14	.51			

Table 2d.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 17 bituminous coal samples from Russell County, Virginia--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	
R-6919	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	
R-6945	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	
R-6946	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	
R-6947	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	
R-6948	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	
R-7161	2.5	32.2	61.5	3.8	5.1	82.2	1.1	7.3	.4	7,970	14,350	
	---	33.0	63.1	3.9	4.9	84.3	1.1	5.2	.4	8,170	14,710	
	---	34.4	65.6	---	5.1	87.7	1.2	5.4	.4	8,510	15,310	

Table 2d.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 17 bituminous coal samples from Russell County, Virginia--continued

Sample number	Forms of sulfur				Ash fusion temperature C			
	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform. soften.	fluid	
R-6919	1.3	0.00	0.04	0.66	8.0	1,285	1,345	1,395
	---	.00	.04	.68				
	---	.00	.05	.75				
R-6945	.4	.02	.04	.46	9.0	1,230	1,260	1,290
	---	.02	.04	.47				
	---	.02	.04	.50				
R-6946	.6	.02	.08	.48	9.0	1,170	1,200	1,290
	---	.02	.08	.49				
	---	.02	.09	.51				
R-6947	.2	.02	.10	.46	9.0	1,140	1,195	1,250
	---	.02	.10	.47				
	---	.02	.10	.48				
R-6948	.3	.00	.03	.50	9.0	1,195	1,220	1,275
	---	.00	.03	.51				
	---	.00	.03	.54				
R-7161	.6	.02	.02	.40	4.0	1,320	1,350	1,525
	---	.02	.02	.41				
	---	.02	.02	.43				

Table 2e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 71 bituminous coal samples from Wise County, 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.]

Sample number	Proximate Analysis				Ultimate Analysis				Heat of Combustion		
	Moisture	Volatile matter	Fixed carbon	Ash	Hydrogen	Carbon	Nitrogen	Oxygen	Sulfur	Kcal/kg	Btu/lb
R-6814	1.3	31.1	53.1	14.5	5.0	71.6	1.5	6.8	0.6	7,120	12,820
	---	31.5	53.8	14.7	4.9	72.5	1.5	5.7	.6	7,220	12,990
	---	36.9	63.1	---	5.8	85.0	1.8	6.7	.7	8,460	15,230
R-6815	2.0	32.6	58.7	6.7	5.3	77.5	1.5	7.5	1.5	7,720	13,900
	---	33.3	59.9	6.8	5.2	79.1	1.5	5.8	1.5	7,880	14,180
	---	35.7	64.3	---	5.6	84.9	1.6	6.3	1.6	8,460	15,220
R-6816	2.3	33.0	56.3	8.4	5.3	75.8	1.5	8.1	.9	7,560	13,600
	---	33.8	57.6	8.6	5.2	77.6	1.5	6.2	.9	7,730	13,920
	---	37.0	63.0	---	5.6	84.9	1.7	6.8	1.0	8,460	15,230
R-6817	3.6	32.9	58.0	5.5	5.4	74.8	1.5	9.9	2.9	7,670	13,810
	---	34.1	60.2	5.7	5.2	77.6	1.6	7.0	3.0	7,960	14,330
	---	36.2	63.8	---	5.5	82.3	1.7	7.4	3.2	8,440	15,190
R-6818	2.6	34.8	56.3	6.3	5.3	76.1	1.4	7.8	3.1	7,650	13,770
	---	35.7	57.8	6.5	5.1	78.1	1.4	5.6	3.2	7,850	14,140
	---	38.2	61.8	---	5.5	83.5	1.5	6.0	3.4	8,400	15,120
R-6819	1.9	36.5	56.1	5.5	5.4	77.4	1.4	7.2	3.1	7,840	14,120
	---	37.2	57.2	5.6	5.3	78.9	1.4	5.6	3.2	8,000	14,390
	---	39.4	60.6	---	5.6	83.6	1.5	6.0	3.3	8,470	15,250
R-6820	1.3	35.2	57.2	6.3	5.7	79.2	1.7	6.5	.6	7,910	14,230
	---	35.7	58.0	6.4	5.6	80.2	1.7	5.4	.6	8,010	14,420
	---	38.1	61.9	---	6.0	85.7	1.8	5.8	.6	8,560	15,400
R-6821	6.4	31.2	59.6	2.8	5.7	78.4	1.5	10.9	.7	7,760	13,970
	---	33.3	63.7	3.0	5.3	83.8	1.6	5.6	.7	8,290	14,930
	---	34.4	65.6	---	5.5	86.3	1.7	5.7	.8	8,550	15,390
R-6822	2.9	32.2	53.5	11.4	5.0	72.2	1.5	7.1	2.8	7,240	13,030
	---	33.2	55.1	11.7	4.8	74.4	1.5	4.7	2.9	7,460	13,420
	---	37.6	62.4	---	5.5	84.2	1.8	5.3	3.3	8,450	15,200
R-6823	6.2	32.2	54.0	7.6	5.6	74.4	1.4	10.3	.7	7,410	13,330
	---	34.3	57.6	8.1	5.2	79.3	1.5	5.1	.7	7,900	14,210
	---	37.4	62.6	---	5.7	86.3	1.6	5.6	.8	8,590	15,460
R-6824	3.5	34.4	58.5	3.6	5.6	79.0	1.2	9.5	1.1	7,830	14,100
	---	35.6	60.6	3.7	5.4	81.9	1.2	6.6	1.1	8,120	14,610
	---	37.0	63.0	---	5.6	85.0	1.3	6.9	1.2	8,430	15,180

Table 2e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 71 bituminous coal samples from Wise County, Virginia--continued

Sample number	Forms of sulfur				Ash fusion temperature C			
	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
R-6814	0.0	0.02	0.13	0.44	9.0	1,540	1,540	1,540
	---	.02	.13	.45				
	---	.02	.15	.52				
R-6815	.0	.04	.67	.81	9.0	1,055	1,110	1,215
	---	.04	.68	.83				
	---	.04	.73	.89				
R-6816	.0	.02	.23	.68	9.0	1,430	1,500	1,540
	---	.02	.24	.70				
	---	.02	.26	.76				
R-6817	.0	.02	1.94	.91	9.0	1,090	1,140	1,180
	---	.02	2.01	.94				
	---	.02	2.13	1.00				
R-6818	.0	.02	1.83	1.26	9.0	1,120	1,175	1,220
	---	.02	1.88	1.29				
	---	.02	2.01	1.38				
R-6819	.0	.02	2.03	1.07	9.0	1,100	1,150	1,215
	---	.02	2.07	1.09				
	---	.02	2.19	1.16				
R-6820	.0	.02	.06	.49	9.0	1,315	1,390	1,455
	---	.02	.06	.50				
	---	.02	.06	.53				
R-6821	.0	.02	.03	.64	9.0	1,600	1,600	1,600
	---	.02	.03	.68				
	---	.02	.03	.70				
R-6822	.0	.22	1.77	.77	7.5	1,145	1,240	1,320
	---	.23	1.82	.79				
	---	.26	2.07	.90				
R-6823	.0	.04	.07	.60	8.0	1,405	1,455	1,600
	---	.04	.07	.64				
	---	.05	.08	.70				
R-6824	.0	.02	.26	.82	9.0	1,125	1,175	1,225
	---	.02	.27	.85				
	---	.02	.28	.88				

Table 2e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 71 bituminous coal samples from Wise County, Virginia--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		
R-6825	2.5	36.1	59.2	2.2	5.6	80.7	1.2	9.1	1.2	8,060	14,500		
	---	37.0	60.7	2.3	5.5	82.8	1.2	7.1	1.2	8,260	14,870		
	---	37.9	62.1	---	5.6	84.7	1.3	7.2	1.3	8,450	15,220		
R-6826	1.7	35.2	58.0	5.1	5.4	80.4	1.3	7.3	.5	8,010	14,410		
	---	35.8	59.0	5.2	5.3	81.8	1.3	5.9	.5	8,140	14,660		
	---	37.8	62.2	---	5.6	86.3	1.4	6.2	.5	8,590	15,460		
R-6827	4.9	32.3	57.5	19.2	5.6	76.5	1.1	9.9	1.6	7,620	13,710		
	---	34.0	60.5	20.2	5.3	80.4	1.2	5.8	1.7	8,010	14,420		
	---	42.6	75.8	---	6.7	100.8	1.4	7.3	2.1	10,040	18,060		
R-6828	1.4	34.1	60.8	3.7	5.4	81.5	1.5	7.3	.6	8,110	14,600		
	---	34.6	61.7	3.8	5.3	82.7	1.5	6.1	.6	8,230	14,810		
	---	35.9	64.1	---	5.5	85.9	1.6	6.4	.6	8,550	15,380		
R-6829	2.7	32.0	53.7	6.5	5.0	72.5	.9	7.6	2.4	7,240	13,030		
	---	32.9	55.2	6.7	4.8	74.5	.9	5.3	2.5	7,440	13,390		
	---	35.2	59.1	---	5.2	79.8	1.0	5.7	2.6	7,970	14,350		
R-6830	3.9	34.3	51.3	10.5	5.2	71.8	1.2	8.0	3.3	7,210	12,980		
	---	35.7	53.4	10.9	5.0	74.7	1.2	4.7	3.4	7,500	13,510		
	---	40.1	59.9	---	5.6	83.9	1.4	5.3	3.9	8,420	15,160		
R-6831	1.5	33.5	54.6	10.4	5.0	73.5	1.2	5.5	4.4	7,380	13,290		
	---	34.0	55.4	10.6	4.9	74.6	1.2	4.2	4.5	7,500	13,490		
	---	38.0	62.0	---	5.5	83.4	1.4	4.7	5.0	8,380	15,090		
R-6832	3.4	35.0	59.1	2.5	5.7	80.3	1.2	9.2	1.1	7,920	14,260		
	---	36.2	61.2	2.6	5.5	83.1	1.2	6.4	1.1	8,200	14,760		
	---	37.2	62.8	---	5.7	85.3	1.3	6.6	1.2	8,420	15,150		
R-6833	3.9	35.0	55.0	6.1	5.4	76.3	1.0	8.2	3.0	7,650	13,770		
	---	36.4	57.2	6.3	5.2	79.4	1.0	4.9	3.1	7,960	14,330		
	---	38.9	61.1	---	5.5	84.8	1.1	5.3	3.3	8,500	15,300		
R-6834	4.3	35.8	57.0	2.9	5.7	79.7	1.1	9.7	.9	7,940	14,290		
	---	37.4	59.6	3.0	5.5	83.3	1.1	6.1	.9	8,300	14,930		
	---	38.6	61.4	---	5.6	85.9	1.2	6.3	1.0	8,550	15,400		
R-6835	1.2	32.2	57.3	9.3	5.3	76.7	1.5	6.5	.7	7,640	13,760		
	---	32.6	58.0	9.4	5.2	77.6	1.5	5.5	.7	7,740	13,930		
	---	36.0	64.0	---	5.8	85.7	1.7	6.1	.8	8,540	15,370		
R-6836	4.3	32.3	58.5	4.9	5.6	77.8	1.6	9.0	1.1	7,720	13,890		
	---	33.8	61.1	5.1	5.4	81.3	1.7	5.4	1.1	8,060	14,510		
	---	35.6	64.4	---	5.6	85.7	1.8	5.7	1.2	8,500	15,300		

Table 2e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 71 bituminous coal samples from Wise County, Virginia--continued

Sample number	Forms of sulfur				Ash fusion temperature C		
	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften. fluid
R-6825	.0	0.07	0.52	0.59	9.0	1,100	1,195 1,245
	---	.07	.53	.61			
	---	.07	.55	.62			
R-6826	.0	.02	.02	.47	9.0	1,375	1,535 1,540
	---	.02	.02	.48			
	---	.02	.02	.50			
R-6827	.0	.25	1.00	.38	9.0	1,200	1,315 1,365
	---	.26	1.05	.40			
	---	.33	1.32	.50			
R-6828	.0	.02	.06	.55	8.5	1,375	1,425 1,475
	---	.02	.06	.56			
	---	.02	.06	.58			
R-6829	.0	.04	1.99	.33	8.5	1,255	1,370 1,410
	---	.04	2.05	.34			
	---	.04	2.19	.36			
R-6830	.0	.02	2.32	.99	8.5	1,150	1,245 1,265
	---	.02	2.41	1.03			
	---	.02	2.71	1.16			
R-6831	.0	.02	3.30	1.09	9.0	1,140	1,205 1,225
	---	.02	3.35	1.11			
	---	.02	3.75	1.24			
R-6832	.0	.02	.30	.78	9.0	1,100	1,165 1,205
	---	.02	.31	.81			
	---	.02	.32	.83			
R-6833	.0	.02	2.12	.91	9.0	1,150	1,210 1,245
	---	.02	2.21	.95			
	---	.02	2.36	1.01			
R-6834	.0	.02	.22	.62	9.0	1,370	1,420 1,480
	---	.02	.23	.65			
	---	.02	.24	.67			
R-6835	.0	.02	.50	.17	8.0	1,455	1,525 1,540
	---	.02	.51	.17			
	---	.02	.56	.19			
R-6836	.0	.02	.64	.48	9.0	1,360	1,430 1,480
	---	.02	.67	.50			
	---	.02	.70	.53			

Table 2e.--Proximate and ultimate analyses, heat content, heat of sulfur, free-swelling index and ash-fusion temperature determinations for 71 bituminous coal samples from Wise County, Virginia--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		
R-6837	4.1	30.2	58.1	7.6	5.5	76.2	1.6	8.2	0.9	7,550	13,590		
	---	31.5	60.6	7.9	5.3	79.5	1.7	4.8	.9	7,870	14,170		
	---	34.2	65.8	---	5.7	86.3	1.8	5.2	1.0	8,550	15,390		
R-6838	3.7	34.9	56.4	5.0	5.7	77.0	1.4	8.8	2.1	7,700	13,860		
	---	36.2	58.6	5.2	5.5	80.0	1.5	5.7	2.2	8,000	14,390		
	---	38.2	61.8	---	5.8	84.3	1.5	6.0	2.3	8,430	15,180		
R-6839	3.1	30.1	63.0	3.8	5.5	80.7	1.6	7.8	.6	8,020	14,430		
	---	31.1	65.0	3.9	5.3	83.3	1.7	5.2	.6	8,270	14,890		
	---	32.3	67.7	---	5.5	86.7	1.7	5.4	.6	8,610	15,500		
R-6840	3.9	32.2	61.9	2.0	5.8	81.3	1.6	8.8	.5	8,050	14,490		
	---	33.5	64.4	2.1	5.6	84.6	1.7	5.5	.5	8,380	15,080		
	---	34.2	65.8	---	5.7	86.4	1.7	5.7	.5	8,550	15,400		
R-6841	2.9	29.9	58.2	9.0	5.4	75.7	1.5	7.6	.8	7,510	13,510		
	---	30.8	59.9	9.3	5.2	78.0	1.5	5.2	.8	7,730	13,910		
	---	33.9	66.1	---	5.8	85.9	1.7	5.7	.9	8,520	15,330		
R-6842	2.6	31.5	62.1	3.8	5.4	80.3	1.6	7.7	1.2	7,980	14,370		
	---	32.3	63.8	3.9	5.2	82.4	1.6	5.5	1.2	8,200	14,750		
	---	33.7	66.3	---	5.5	85.8	1.7	5.8	1.3	8,530	15,350		
R-6844	4.0	32.6	57.5	5.9	5.7	77.7	1.6	8.3	.8	7,720	13,900		
	---	34.0	59.9	6.1	5.5	80.9	1.7	4.9	.8	8,040	14,480		
	---	36.2	63.8	---	5.8	86.2	1.8	5.3	.9	8,570	15,430		
R-6845	2.6	33.9	53.0	10.5	5.2	72.9	1.1	5.4	4.9	7,410	13,340		
	---	34.8	54.4	10.8	5.0	74.8	1.1	3.2	5.0	7,610	13,700		
	---	39.0	61.0	---	5.7	83.9	1.3	3.6	5.6	8,530	15,350		
R-6846	11.0	28.2	54.1	6.7	5.5	68.9	1.4	16.6	.9	6,670	12,010		
	---	31.7	60.8	7.5	4.8	77.4	1.6	7.7	1.0	7,500	13,490		
	---	34.3	65.7	---	5.2	83.7	1.7	8.3	1.1	8,110	14,590		
R-6847	4.4	27.5	59.5	8.6	5.1	74.9	1.7	8.7	1.0	7,440	13,400		
	---	28.8	62.2	9.0	4.8	78.3	1.8	5.0	1.0	7,790	14,020		
	---	31.6	68.4	---	5.3	86.1	2.0	5.5	1.1	8,560	15,400		
R-6848	4.5	29.3	50.0	16.2	4.9	65.9	1.4	8.9	2.7	6,590	11,870		
	---	30.7	52.4	17.0	4.6	69.0	1.5	5.1	2.8	6,910	12,430		
	---	36.9	63.1	---	5.5	83.1	1.8	6.2	3.4	8,320	14,970		
R-6849	2.3	32.4	58.5	6.8	5.4	75.4	1.7	9.8	.9	7,760	13,970		
	---	33.2	59.9	7.0	5.3	77.2	1.7	7.9	.9	7,940	14,300		
	---	35.6	64.4	---	5.7	82.9	1.9	8.5	1.0	8,540	15,370		

Table 2e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 71 bituminous coal samples from Wise County, Virginia--continued

Sample number	Forms of sulfur				Ash fusion temperature C			
	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
R-6837	0.0	0.17	0.28	0.47	8.5	1,355	1,420	1,455
	---	.18	.29	.49				
	---	.19	.32	.53				
R-6838	.0	.02	.96	1.14	9.0	1,095	1,155	1,180
	---	.02	1.00	1.18				
	---	.02	1.05	1.25				
R-6839	.0	.02	.15	.40	9.0	1,090	1,175	1,215
	---	.02	.15	.41				
	---	.02	.16	.43				
R-6840	.0	.02	.18	.34	9.0	1,320	1,390	1,445
	---	.02	.19	.35				
	---	.02	.19	.36				
R-6841	.0	.31	.28	.26	8.0	1,520	1,540	1,540
	---	.32	.29	.27				
	---	.35	.32	.30				
R-6842	.0	.02	.50	.67	9.0	1,110	1,155	1,225
	---	.02	.51	.69				
	---	.02	.53	.72				
R-6844	.0	.02	.06	.68	9.0	1,540	1,540	1,540
	---	.02	.06	.71				
	---	.02	.07	.75				
R-6845	.0	.02	2.85	2.05	7.0	1,150	1,200	1,255
	---	.02	2.93	2.10				
	---	.02	3.28	2.36				
R-6846	.0	.02	.23	.65	2.0	1,265	1,315	1,355
	---	.02	.26	.73				
	---	.02	.28	.79				
R-6847	.0	.02	.24	.72	8.5	1,480	1,530	1,540
	---	.02	.25	.75				
	---	.02	.28	.83				
R-6848	.0	.02	1.37	1.27	9.0	1,170	1,235	1,320
	---	.02	1.43	1.33				
	---	.03	1.73	1.60				
R-6849	.0	.02	.25	.62	9.0	1,425	1,480	1,535
	---	.02	.26	.63				
	---	.02	.28	.68				

Table 2e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 71 bituminous coal samples from Wise County, Virginia--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		
R-6850	2.6	33.8	57.2	6.4	5.4	76.7	1.5	7.3	2.7	7,690	13,850		
	---	34.7	58.7	6.6	5.2	78.7	1.5	5.1	2.8	7,900	14,220		
	---	37.1	62.9	---	5.6	84.3	1.6	5.5	3.0	8,460	15,220		
R-6851	2.4	30.2	55.0	12.4	5.1	71.5	1.4	7.3	2.3	7,130	12,830		
	---	30.9	56.4	12.7	5.0	73.3	1.4	5.3	2.4	7,300	13,150		
	---	35.4	64.6	---	5.7	83.9	1.6	6.1	2.7	8,370	15,060		
R-6855	6.0	28.2	57.1	8.7	5.2	71.8	1.5	9.5	3.3	7,120	12,810		
	---	30.0	60.7	9.3	4.8	76.4	1.6	4.4	3.5	7,570	13,630		
	---	33.1	66.9	---	5.3	84.2	1.8	4.9	3.9	8,340	15,020		
R-6858	3.9	30.3	60.7	5.1	5.5	78.8	1.7	8.1	.9	7,810	14,060		
	---	31.5	63.2	5.3	5.3	82.0	1.8	4.8	.9	8,130	14,630		
	---	33.3	66.7	---	5.6	86.6	1.9	5.1	1.0	8,590	15,450		
R-6859	4.0	22.6	36.8	36.6	3.9	49.2	1.1	8.3	.8	4,880	8,790		
	---	23.5	38.3	38.1	3.6	51.2	1.1	4.9	.8	5,080	9,150		
	---	38.0	62.0	---	5.8	82.8	1.9	8.0	1.3	8,220	14,790		
R-6860	2.1	31.9	60.0	6.0	5.3	79.0	1.8	7.1	.8	7,870	14,170		
	---	32.6	61.3	6.1	5.2	80.7	1.8	5.3	.8	8,040	14,480		
	---	34.7	65.3	---	5.5	86.0	2.0	5.7	.9	8,570	15,420		
R-6868	3.0	31.7	55.4	9.9	5.0	74.1	1.4	8.8	.8	7,290	13,130		
	---	32.7	57.1	10.2	4.8	76.4	1.4	6.3	.8	7,520	13,530		
	---	36.4	63.6	---	5.4	85.1	1.6	7.0	.9	8,370	15,070		
R-6871	1.5	33.5	53.3	11.7	5.1	74.3	1.4	6.3	1.2	7,380	13,280		
	---	34.0	54.1	11.9	5.0	75.4	1.4	5.0	1.2	7,490	13,480		
	---	38.6	61.4	---	5.7	85.6	1.6	5.7	1.4	8,500	15,300		
R-6872	1.5	32.9	50.6	15.0	4.7	70.9	1.4	6.8	1.2	6,960	12,530		
	---	33.4	51.4	15.2	4.6	72.0	1.4	5.5	1.2	7,070	12,730		
	---	39.4	60.6	---	5.4	84.9	1.7	6.5	1.4	8,340	15,010		
R-6908	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		
R-6909	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		
R-6910	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 2e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 71 bituminous coal samples from Wise County, Virginia--continued

Sample number	Forms of sulfur				Ash fusion temperature C		
	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften. fluid
R-6850	0.0	0.02	1.70	0.97	9.0	1,060	1,115 1,165
	---	.02	1.75	1.00			
	---	.02	1.87	1.07			
R-6851	.0	.02	1.93	.32	8.5	1,305	1,370 1,440
	---	.02	1.98	.33			
	---	.02	2.27	.38			
R-6855	.0	.02	2.20	1.12	9.0	1,075	1,140 1,215
	---	.02	2.34	1.19			
	---	.02	2.58	1.31			
R-6858	2.9	.00	.00	.80	9.0	1,540	1,540 1,540
	---	.00	.00	.83			
	---	.00	.00	.88			
R-6859	2.7	.10	.30	.40	5.5	1,540	1,540 1,540
	---	.10	.31	.42			
	---	.17	.51	.67			
R-6860	1.0	.00	.10	.70	9.0	1,540	1,540 1,540
	---	.00	.10	.72			
	---	.00	.11	.76			
R-6868	1.4	.00	.30	.50	4.0	1,220	1,265 1,295
	---	.00	.31	.52			
	---	.00	.34	.57			
R-6871	.6	.04	.45	.67	5.5	1,425	1,465 1,500
	---	.04	.46	.68			
	---	.05	.52	.77			
R-6872	.6	.01	.49	.71	6.0	1,205	1,260 1,305
	---	.01	.50	.72			
	---	.01	.59	.85			
R-6908	1.7	.01	.19	.64	5.5	1,540	1,540 1,540
	---	.01	.20	.66			
	---	.01	.22	.73			
R-6909	2.6	.04	.33	.57	8.0	1,540	1,540 1,540
	---	.04	.34	.59			
	---	.05	.39	.68			
R-6910	1.2	.01	.14	.42	8.5	1,340	1,395 1,455
	---	.01	.14	.43			
	---	.01	.15	.45			

Table 2e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 71 bituminous coal samples from Wise County, Virginia--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		
R-6911	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		
R-6912	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		
R-6913	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		
R-6914	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		
R-6915	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		
R-6916	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		
R-6934	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		
R-6935	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		
R-6936	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		
R-6937	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		
R-6938	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		
R-6939	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		

Table 2e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 71 bituminous coal samples from Wise County, Virginia--continued

Sample number	Forms of sulfur				Ash fusion temperature C			
	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
R-6911	2.6	0.08	1.47	1.07	9.0	1,150	1,215	1,265
	---	.08	1.53	1.11				
	---	.09	1.63	1.19				
R-6912	1.1	.00	.05	.60	9.0	1,395	1,455	1,515
	---	.00	.05	.61				
	---	.00	.05	.65				
R-6913	2.1	.00	.07	.74	9.0	1,540	1,540	1,540
	---	.00	.07	.77				
	---	.00	.08	.82				
R-6914	1.7	.01	.23	.61	5.0	1,540	1,540	1,540
	---	.01	.24	.63				
	---	.01	.29	.77				
R-6915	1.8	.01	.33	.81	9.0	1,540	1,540	1,540
	---	.01	.34	.84				
	---	.01	.40	.98				
R-6916	1.3	.05	.12	.45	9.0	1,490	1,540	1,540
	---	.05	.12	.46				
	---	.06	.13	.51				
R-6934	2.1	.01	.16	.70	9.0	1,130	1,180	1,240
	---	.01	.17	.73				
	---	.01	.17	.75				
R-6935	4.4	.01	.08	.54	9.0	1,410	1,460	1,515
	---	.01	.08	.57				
	---	.01	.09	.61				
R-6936	1.4	.01	.06	.45	2.0	1,540	1,540	1,540
	---	.01	.06	.46				
	---	.01	.08	.61				
R-6937	.9	.00	.00	.00	1.0	1,290	1,345	1,405
	---	.00	.00	.00				
	---	.00	.00	.00				
R-6938	.6	.05	4.20	.97	9.0	1,145	1,205	1,270
	---	.05	4.27	.99				
	---	.06	4.82	1.11				
R-6939	1.1	.01	1.89	.56	9.0	1,100	1,160	1,225
	---	.01	1.93	.57				
	---	.01	2.07	.61				

Table 2e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 71 bituminous coal samples from Wise County, Virginia--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	
R-6940	2.1	34.5	52.9	10.5	5.2	75.0	1.4	7.2	0.7	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	
R-7068	1.9	37.6	54.8	5.7	5.4	78.3	1.6	7.5	1.6	7,760	13,970	
	---	38.3	55.9	5.8	5.3	79.8	1.6	5.9	1.6	7,910	14,240	
	---	40.7	59.3	---	5.6	84.7	1.7	6.3	1.7	8,400	15,120	
R-7070	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	
R-7071	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	
R-7072	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	
R-7073	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	
R-7160	2.8	31.6	63.4	2.2	5.5	82.4	1.5	7.0	1.3	8,140	14,640	
	---	32.5	65.2	2.3	5.3	84.8	1.5	4.6	1.3	8,370	15,070	
	---	33.3	66.7	---	5.5	86.7	1.6	4.7	1.4	8,560	15,420	
R-7168	2.9	35.1	59.2	2.8	5.5	81.7	1.5	7.6	.9	8,050	14,490	
	---	36.1	61.0	2.9	5.3	84.1	1.5	5.2	.9	8,290	14,920	
	---	37.2	62.8	---	5.5	86.6	1.6	5.3	1.0	8,540	15,370	
R-7169	3.0	31.5	59.9	5.6	5.3	78.8	1.5	7.7	1.1	7,790	14,020	
	---	32.5	61.8	5.8	5.1	81.2	1.5	5.2	1.1	8,030	14,460	
	---	34.5	65.5	---	5.4	86.2	1.6	5.5	1.2	8,520	15,340	
R-7171	1.3	38.2	56.4	4.1	5.6	81.1	1.7	7.1	.5	8,070	14,520	
	---	38.7	57.1	4.2	5.5	82.2	1.7	6.0	.5	8,170	14,710	
	---	40.4	59.6	---	5.8	85.7	1.8	6.3	.5	8,530	15,350	
R-7174	5.5	33.7	54.6	6.2	5.5	75.0	1.4	10.6	1.2	7,350	13,230	
	---	35.7	57.8	6.6	5.2	79.4	1.5	6.0	1.3	7,780	14,010	
	---	38.2	61.8	---	5.5	84.9	1.6	6.5	1.4	8,330	14,990	
R-7175	4.0	32.1	58.5	5.4	5.5	77.6	1.6	9.0	.8	7,680	13,820	
	---	33.4	60.9	5.6	5.3	80.8	1.7	5.7	.8	8,000	14,400	
	---	35.4	64.6	---	5.6	85.7	1.8	6.0	.9	8,470	15,250	

Table 2e.--Proximate and ultimate analyses, heat content, forms of sulfur, free-swelling index and ash-fusion temperature determinations for 71 bituminous coal samples from Wise County, Virginia--continued

Sample number	Forms of sulfur					Ash fusion temperature C		
	Air-dried loss	Sulfate	Pyritic	Organic	Free swelling	Initial deform.	soften.	fluid
R-6940	0.7	0.01	0.21	0.53	8.0	1,540	1,540	1,540
	---	.01	.21	.54				
	---	.01	.24	.61				
R-7068	.6	.04	.91	.62	7.0	1,140	1,195	1,315
	---	.04	.93	.63				
	---	.04	.98	.67				
R-7070	1.5	.11	.98	1.31	9.0	1,140	1,240	1,350
	---	.11	1.01	1.35				
	---	.12	1.08	1.45				
R-7071	.9	.01	.20	.60	9.0	1,600	1,600	1,600
	---	.01	.20	.61				
	---	.01	.22	.66				
R-7072	.5	.02	.19	.55	7.0	1,445	1,470	1,555
	---	.02	.19	.56				
	---	.02	.22	.62				
R-7073	.8	.01	.10	.60	7.0	1,355	1,410	1,600
	---	.01	.10	.61				
	---	.01	.11	.67				
R-7160	1.0	.03	.41	.84	8.0	1,080	1,110	1,175
	---	.03	.42	.86				
	---	.03	.43	.88				
R-7168	1.4	.04	.22	.68	8.0	1,180	1,225	1,340
	---	.04	.23	.70				
	---	.04	.23	.72				
R-7169	1.3	.03	.25	.79	8.0	1,380	1,395	1,600
	---	.03	.26	.81				
	---	.03	.27	.86				
R-7171	.1	.02	.08	.45	6.5	1,125	1,155	1,265
	---	.02	.08	.46				
	---	.02	.08	.48				
R-7174	3.2	.06	.44	.65	4.5	1,165	1,325	1,415
	---	.06	.47	.69				
	---	.07	.50	.74				
R-7175	2.4	.04	.07	.67	8.0	1,440	1,600	1,600
	---	.04	.07	.70				
	---	.04	.08	.74				

Table 3a.--Major and minor oxide and trace element composition of the laboratory ash of 28 bituminous coal samples from Buchanan County, 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 spectrographic 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)	SiO ₂ (percent)	Al ₂ O ₃ (percent)	CaO (percent)	MgO (percent)	Na ₂ O (percent)	K ₂ O (percent)	Fe ₂ O ₃ (percent)	TiO ₂ (percent)	P ₂ O ₅ (percent)	Sample number
R-6876	4.8	41	23	0.96	1.2	0.84	3.3	23	0.74	0.10	R-6876
R-6877	12.1	44	17	.88	.65	.36	2.2	27	.64	.16	R-6877
R-6878	11.1	71	17	.40	.40	1.0	2.0	3.9	2.6	.09	R-6878
R-6879	21.3	43	25	1.0	1.4	.20	3.8	17	.86	.06	R-6879
R-6880	1.9	40	22	2.0	1.3	2.3	2.2	20	.67	.13	R-6880
R-6881	4.7	16	11	1.1	.40	.85	.82	57	.30	.08	R-6881
R-6882	16.9	42	28	4.0	.61	.74	1.6	3.6	1.3	.19	R-6882
R-6883	11.8	28	13	20	1.6	.83	.72	9.1	.88	.15	R-6883
R-6884	5.7	31	17	14	1.3	.76	.78	12	1.2	.12	R-6884
R-6885	2.9	36	24	4.5	1.8	.23	2.0	16	1.1	.08	R-6885
R-6889	2.3	39	13	5.6	.98	1.2	1.5	20	.48	.24	R-6889
R-6890	10.5	56	25	.89	1.1	.72	2.8	5.1	1.6	1.7	R-6890
R-6891	10.1	43	25	2.3	.98	.58	3.6	13	.83	.11	R-6891
R-6893	25.9	47	22	.77	1.7	.21	3.9	14	1.2	.03	R-6893
R-6894	6.2	53	30	1.3	.32	.22	1.8	4.4	1.8	.19	R-6894
R-6895	8.3	29	19	1.0	.45	.38	2.5	37	.78	.08	R-6895
R-6896	2.1	B	B	B	.76	1.9	B	B	B	B	R-6896
R-6897	6.7	52	32	1.1	.46	.70	.76	4.5	1.7	.04	R-6897
R-6898	7.0	46	24	.60	1.3	.58	4.2	12	.89	.07	R-6898
R-6899	2.7	43	22	1.7	.71	1.5	2.5	17	1.2	.16	R-6899
R-6900	11.6	57	26	.70	.56	.35	2.1	8.3	2.5	.03	R-6900
R-6901	12.3	46	29	.64	1.2	.66	5.0	10	.91	.03	R-6901
R-6902	23.4	54	25	.57	1.8	.35	4.8	8.4	1.0	.06	R-6902
R-6903	5.7	42	21	.95	1.3	1.1	3.3	20	.72	.07	R-6903
R-6904	16.5	56	28	.92	.66	.25	2.2	4.4	1.7	.47	R-6904
R-6905	7.3	B	B	B	.46	.65	B	B	B	B	R-6905
R-6906	5.2	52	25	1.1	.58	.65	1.0	9.8	1.5	.08	R-6906
R-6907	21.0	60	28	.58	.73	.26	2.3	2.9	2.2	.24	R-6907

Table 3a.--Major and minor oxide and trace element composition of the laboratory ash of 28 bituminous coal samples from Buchanan County, Virginia--continued

Sample number	S ₀₃ (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
R-6876	1.8	0.30	160	760	79	4.0	170	200	130	15	R-6876
R-6877	2.2	.40	H	2,300	49	.82	220	130	97	11	R-6877
R-6878	.61	.20	180	610	18	.22	150	26	110	5.4	R-6878
R-6879	1.8	.10	110	590	50	2.2	47	50	37	5.2	R-6879
R-6880	3.6	.90	230	950	120	2.7	260	290	170	21	R-6880
R-6881	2.3	.60	H	450	27	2.2	150	110	85	4.3	R-6881
R-6882	.32	.20	91	910	14	.60	140	22	120	5.3	R-6882
R-6883	16	.20	95	930	8.0	.70	140	53	87	2.5	R-6883
R-6884	13	.60	76	910	30	.62	260	160	160	8.8	R-6884
R-6885	6.9	.40	58	810	53	.14	380	160	170	10	R-6885
R-6889	8.8	.70	140	1,000	70	1.5	170	250	120	8.7	R-6889
R-6890	1.3	.30	120	730	13	.26	210	45	140	14	R-6890
R-6891	3.8	.30	86	630	25	.40	150	41	110	18	R-6891
R-6893	1.2	.20	110	800	31	.51	58	27	47	6.2	R-6893
R-6894	1.6	.50	63	510	14	.10	240	52	150	6.5	R-6894
R-6895	1.9	.70	H	500	37	1.8	200	190	120	12	R-6895
R-6896	B	.70	210	920	85	1.7	140	140	150	9.5	R-6896
R-6897	.77	.50	74	650	25	.55	240	100	230	6.0	R-6897
R-6898	1.4	.30	120	670	33	1.3	160	81	130	23	R-6898
R-6899	2.4	.50	270	950	72	4.7	190	260	130	15	R-6899
R-6900	.58	.30	73	840	64	.37	160	66	160	12	R-6900
R-6901	.78	.20	130	660	14	.53	140	32	130	24	R-6901
R-6902	.62	.10L	110	580	15	.38	120	37	110	18	R-6902
R-6903	2.3	.10	190	1,900	18	1.1	140	72	110	16	R-6903
R-6904	.60	.30	63	680	16	.34	160	58	140	13	R-6904
R-6905	B	.40	71	780	25	.22	220	120	200	5.5	R-6905
R-6906	1.8	.40	96	780	36	.62	170	40	110	3.8	R-6906
R-6907	.30	.20	75	550	19	.24	140	62	160	10	R-6907

Table 3a.--Major and minor oxide and trace element composition of the laboratory ash of 28 bituminous coal samples from Buchanan County, 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)	La (ppm)	Li (ppm)	Sample number
R-6876	380	30	15	4.2	100	21	79	4.2	83	130	R-6876
R-6877	170	32L	10L	3.3	41	23	70	5.8	140	67	R-6877
R-6878	95	32L	10L	2.0	37	9.0	37	12	110	49	R-6878
R-6879	330	32L	10L	1.1	75	7.0	59	1.9	23	100	R-6879
R-6880	510	37	21	11	110	37	170	16	110	65	R-6880
R-6881	340	32L	10L	5.3	60	30	9.0	4.3	64	21	R-6881
R-6882	140	32L	12	2.5	27	7.0L	5.0L	7.7	77	170	R-6882
R-6883	130	32L	10L	2.5	6.0	11	5.0L	5.9	85	90	R-6883
R-6884	290	32L	14	4.6	34	26	15	11	140	130	R-6884
R-6885	340	32L	10L	6.9	51	14	160	10	170	210	R-6885
R-6889	330	32L	10L	4.8	58	31	91	4.3	87	53	R-6889
R-6890	190	32L	10L	3.4	42	7.0L	5.0L	8.6	110	190	R-6890
R-6891	170	32L	10L	2.6	38	7.0L	5.0L	4.0	69	140	R-6891
R-6893	120	32L	10L	1.1	45	8.0	10	2.3	31	74	R-6893
R-6894	130	32L	10L	4.0	40	7.0	7.0	9.7	130	250	R-6894
R-6895	530	32L	15	6.7	41	18	9.0	4.8	96	110	R-6895
R-6896	450	32L	19	4.3	80	22	100	14L	95	74	R-6896
R-6897	200	32L	11	4.0	44	10	52	10	130	250	R-6897
R-6898	240	32L	10L	3.4	63	9.0	10	4.3	86	100	R-6898
R-6899	620	32L	10L	5.2	93	23	31	7.4	74	81	R-6899
R-6900	240	32L	10L	3.4	58	11	22	12	86	180	R-6900
R-6901	160	32L	10L	2.4	55	7.0L	11	4.9	73	79	R-6901
R-6902	110	32L	10L	2.0	43	7.0L	5.0L	4.7	64	89	R-6902
R-6903	250	32L	10L	3.3	53	10	5.0	3.5	70	160	R-6903
R-6904	130	32L	10	2.5	33	7.0L	8.0	7.3	97	250	R-6904
R-6905	190	32L	14	3.8	49	7.0L	53	9.6	120	220	R-6905
R-6906	190	32L	12	2.9	66	12	14	7.7	120	170	R-6906
R-6907	100	32L	10L	2.3	50	7.0L	55	8.6	86	530	R-6907

VIRGINIA DIVISION OF MINERAL RESOURCES

Table 3a.--Major and minor oxide and trace element composition of the laboratory ash of 28 bituminous coal samples from Buchanan County, Virginia--continued

Sample number	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Pr-S (ppm)	Rb (ppm)	Sc (ppm)	Sample number
R-6876	2	220	83	15	100	330	59	150L	230	52	R-6876
R-6877	2	150	17	12	110	210	22	78	120	25	R-6877
R-6878	2	44	8.0	45	69	42	40	68L	99	22	R-6878
R-6879	.9	240	25	4	49	150	110	68L	56	15	R-6879
R-6880	5	190	67	12	130	270	78	68L	370L	110	R-6880
R-6881	2	190	50	11	60	190	18	68L	190L	45	R-6881
R-6882	1	130	16	24	46L	49	54	68L	59	27	R-6882
R-6883	.8	390	16	10	46L	49	10	68L	76L	19	R-6883
R-6884	2	330	33	20	46L	110	30	68L	160L	35	R-6884
R-6885	3	360	19	10	75	120	78	68L	240L	45	R-6885
R-6889	4	1,300	130	16	100	270	58	68L	610L	48	R-6889
R-6890	2	150	10	17	57	81	75	68L	180	32	R-6890
R-6891	1	140	15	8	53	48	30	68L	190	26	R-6891
R-6893	.4	220	13	10	86	100	38	68L	85	12	R-6893
R-6894	2	180	16	18	89	110	75	68L	180L	35	R-6894
R-6895	4	200	34	11	73	150	70	68L	200L	39	R-6895
R-6896	5	140	110	8	120	270	74	68L	760L	38	R-6896
R-6897	1	89	8.0	19	96	220	76	68L	280L	36	R-6897
R-6898	1	170	42	6	98	140	67	68L	270	43	R-6898
R-6899	4	190	45	10	130	280	61	68L	670L	48	R-6899
R-6900	2	92	12	37	46L	87	63	68L	190L	34	R-6900
R-6901	.8	73	20	6	65	70	48	68L	230	31	R-6901
R-6902	.9	230	11	5	59	69	40	68L	250	25	R-6902
R-6903	2	760	43	6	68	120	52.	68L	350L	35	R-6903
R-6904	1	59	8.0	16	90	97	75	68L	160	31	R-6904
R-6905	1	71	8.0	17	110	270	130	68L	300L	44	R-6905
R-6906	2	67	46	24	140	200	65	68L	370L	31	R-6906
R-6907	1	46	3.0L	18	72	110	65	68L	100	34	R-6907

Table 3a.--Major and minor oxide and trace element composition of the laboratory ash of 28 bituminous coal samples from Buchanan County, Virginia--continued

Sample number	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Sample number
R-6876	19	2.0L	1,700	4.2	83	3.0L	40	320	190	19	R-6876
R-6877	17	7.0L	770	2.5	25L	10L	14	180	87	7.4	R-6877
R-6878	14	7.0L	500	1.8	27	10L	9.9	140	31	8.1	R-6878
R-6879	4.7	7.0L	630	1.4	14L	10L	7.0	160	75	4.7	R-6879
R-6880	47	7.0L	1,600	11	160L	10L	53	320	240	32	R-6880
R-6881	23	7.0L	760	4.3	64L	10L	38	160	120	17	R-6881
R-6882	14	7.0L	620	2.4	41	10L	14	140	67	6.5	R-6882
R-6883	14	7.0L	840	1.7	25L	10L	12	71	49	6.8	R-6883
R-6884	26	10	920	5.3	53L	10L	16	140	110	14	R-6884
R-6885	45	11	850	6.9	100L	10L	24	130	85	21	R-6885
R-6889	17	9.0	1,600	4.3	130L	10L	96	310	200	13	R-6889
R-6890	17	13	790	2.9	48	10L	15	140	37	8.6	R-6890
R-6891	13	7.0L	590	2.0	30L	17	27	140	37	5.9	R-6891
R-6893	5.0	7.0L	650	.77	12L	10L	6.9	150	42	2.7	R-6893
R-6894	21	13	710	3.2	48L	10L	15	190	46	9.7	R-6894
R-6895	28	7.0L	530	6.0	36L	37	16	120	120	24	R-6895
R-6896	19	7.0L	1,600	14L	140L	23	76	340	180	14	R-6896
R-6897	22	7.0L	900	3.0	45L	10L	49	230	95	10	R-6897
R-6898	17	7.0L	610	2.9	43L	10L	36	250	99	10	R-6898
R-6899	22	13	1,400	3.7	110L	10L	41	180	140	15	R-6899
R-6900	16	7.0L	380	2.6	34	29	22	170	59	10	R-6900
R-6901	13	7.0L	570	1.6	24L	10L	29	220	37	6.5	R-6901
R-6902	11	7.0L	240	1.7	13L	10L	16	180	38	4.7	R-6902
R-6903	14	7.0L	800	1.8	53L	27	30	190	70	8.8	R-6903
R-6904	13	8.0	780	1.8	18L	10L	14	210	56	6.1	R-6904
R-6905	19	7.0L	970	2.7	41L	10L	45	240	89	9.6	R-6905
R-6906	17	7.0L	960	1.9	58L	10L	40	250	130	9.6	R-6906
R-6907	11	7.0L	610	1.9	24	10L	14	250	52	6.7	R-6907

Table 3a.--Major and minor oxide and trace element composition of the laboratory ash of 28 bituminous coal samples from Buchanan County, Virginia--continued

Sample number	Zn (ppm)	Zr-S (ppm)
R-6876	340	160
R-6877	150	160
R-6878	39	370
R-6879	310	55
R-6880	830	86
R-6881	1,200	51
R-6882	57	220
R-6883	27	150
R-6884	56	220
R-6885	78	75
R-6889	350	130
R-6890	110	90
R-6891	57	70
R-6893	140	100
R-6894	83	94
R-6895	460	56
R-6896	350	96
R-6897	71	180
R-6898	340	93
R-6899	130	110
R-6900	39	510
R-6901	150	50
R-6902	120	71
R-6903	290	77
R-6904	53	120
R-6905	70	160
R-6906	72	270
R-6907	58	130

Table 3b.--Major and minor oxide and trace element composition of the laboratory ash of 17 bituminous coal samples from Dickenson County, 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 spectrographic 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)	S102 (percent)	A1203 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
R-6853	4.5	25	16	1.6	0.60	0.43	1.5	39	1.0	0.11	R-6853
R-6854	2.0	41	34	1.9	.63	1.5	1.3	8.8	1.4	.14	R-6854
R-6857	3.2	29	23	3.2	.80	2.5	1.4	29	.89	.07	R-6857
R-6861	12.0	48	32	1.5	1.3	1.1	1.8	4.7	.92	.03	R-6861
R-6862	22.9	52	29	1.4	1.3	.65	4.3	4.0	1.1	.03	R-6862
R-6865	8.3	52	31	1.4	.68	.34	1.3	7.7	1.5	.09	R-6865
R-6866	7.8	46	28	1.8	.90	.38	3.8	12	.96	.06	R-6866
R-6867	3.0	41	29	3.6	.43	.22	.90	9.6	1.0	.27	R-6867
R-6873	13.9	53	25	2.8	1.4	.44	2.7	6.2	1.3	.05	R-6873
R-6874	28.3	52	30	3.0	.68	.37	3.5	2.9	1.8	.15	R-6874
R-6875	9.3	47	16	11	.98	.29	1.7	7.0	.91	.10	R-6875
R-6920	5.1	43	25	2.4	1.4	.79	2.4	12	1.1	.11	R-6920
R-6922	30.5	63	26	.56	.75	.27	2.8	3.0	2.6	.19	R-6922
R-6941	17.1	56	24	.52	2.2	.32	5.4	6.6	1.2	.04	R-6941
R-6943	8.6	43	23	8.9	1.7	.31	1.6	8.2	1.2	.07	R-6943
R-6944	27.7	62	25	.59	.80	.19	2.9	3.3	2.4	.22	R-6944
R-7069	51.8	60	25	2.1	1.2	.31	3.5	2.8	1.7	.09	R-7069

Table 3b.--Major and minor oxide and trace element composition of the laboratory ash of 17 bituminous coal samples from Dickenson County, Virginia--continued

Sample number	SO ₃ (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
R-6853	2.6	0.50	150	510	36	0.80	110	60	120	6.7	R-6853
R-6854	3.4	1.8	320	750	180	2.8	300	580	280	15	R-6854
R-6857	5.2	.60	320	640	12	2.0	220	250	140	6.3	R-6857
R-6861	2.2	.20	300	920	19	.23	190	27	83	5.8	R-6861
R-6862	1.4	.10L	210	1,300	9.0	.34	140	20	130	17	R-6862
R-6865	1.9	.50	110	640	34	.74	220	130	89	4.8	R-6865
R-6866	2.7	.30	150	780	29	.97	220	130	180	14	R-6866
R-6867	5.2	.70	160	800	41	.54	370	110	110	3.3	R-6867
R-6873	3.5	.20	86	780	9.0	.54	180	75	150	15	R-6873
R-6874	1.6	.10	99	630	9.0	.20	200	39	160	8.8	R-6874
R-6875	7.4	.10L	97	590	17	44	150	48	86	5.4	R-6875
R-6920	4.0	.20	56	680	16	.76	220	120	170	7.8	R-6920
R-6922	.49	.10L	43	460	9.0	.15	200	33	170	12	R-6922
R-6941	.73	.20	110	590	32	.58	150	84	110	15	R-6941
R-6943	5.8	.10L	47	820	16	.28	170	110	130	10	R-6943
R-6944	.59	.10	60	480	11	.19	180	36	160	12	R-6944
R-7069	.98	.20	83	600	8.0	.24	170	20	130	11	R-7069

Table 3b.--Major and minor oxide and trace element composition of the laboratory ash of 17 bituminous coal samples from Dickenson County, 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)	Ho-S (ppm)	La (ppm)	Sample number
R-6853	190	32L	10L	2.2	51	7.0L	120	6.7	7.0L	67	R-6853
R-6854	610	42	26	9.0	120	35	300	10	11	150	R-6854
R-6857	330	35	18	5.3	45	35	9.0	6.3	13	120	R-6857
R-6861	97	22	10L	2.8	56	18	3.0	13	15L	100	R-6861
R-6862	97	22L	10L	2.3	61	11	2.0L	5.7	7.0L	79	R-6862
R-6865	250	32L	10L	3.4	62	7.0L	8.0	13	7.0L	110	R-6865
R-6866	260	35	22	7.2	58	34	7.0	5.1	9.0	100	R-6866
R-6867	250	33	23	8.3	75	31	10	20	10L	200	R-6867
R-6873	130	32L	10L	3.1	48	8.0	9.0	7.9	7.0L	94	R-6873
R-6874	110	32L	10L	3.2	45	9.0	5.0L	9.9	7.0L	120	R-6874
R-6875	140	22	15	3.1	28	20	2.0L	7.5	7.0L	86	R-6875
R-6920	260	22L	10L	5.3	31	12	11	5.9	7.0L	120	R-6920
R-6922	100	22L	10L	2.3	28	7.0L	2.0	13	7.0L	120	R-6922
R-6941	100	32L	10L	2.7	51	7.0L	43	5.8	7.0L	82	R-6941
R-6943	160	22L	10L	3.1	38	15	4.0	7.0	7.0L	93	R-6943
R-6944	100	22L	10L	2.2	36	11	5.0	13	7.0L	110	R-6944
R-7069	79	22L	10L	2.6	33	11	2.0L	9.7	7.0L	91	R-7069

Table 3b.--Major and minor oxide and trace element composition of the laboratory ash of 17 bituminous coal samples from Dickenson County, Virginia--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Rb (ppm)	Sc (ppm)	Sample number
R-6853	86	2	200	30	16	46L	77	48	240L	47	R-6853
R-6854	150	5	200	41	34	170	510	130	650L	100	R-6854
R-6857	110	3	170	57	29	140	650	51	620L	34	R-6857
R-6861	290	2	97	10	81	130	74	110	120	24	R-6861
R-6862	230	.9	130	4.0	19	48	67	40	280	30	R-6862
R-6865	270	2	67	18	35	69	130	200	190L	31	R-6865
R-6866	220	3	180	53	17	180	160	74	210	58	R-6866
R-6867	140	3	120	59	61	150	150	180	370L	50	R-6867
R-6873	150	.7	230	15	11	46L	82	57	170	29	R-6873
R-6874	200	1	170	5.0	11	51	62	50	160	35	R-6874
R-6875	79	1	390	12	19	59	100	33	110	20	R-6875
R-6920	140	2	320	13	5	66	97	51	450L	43	R-6920
R-6922	260	1	56	2.0L	31	48	42	55	250	34	R-6922
R-6941	200	1	290	4.0	13	50	81	44	230	25	R-6941
R-6943	110	1	280	15	20	50	100	47	230L	31	R-6943
R-6944	320	1	60	2.0L	23	64	64	64	360L	31	R-6944
R-7069	350	1	140	3.0	23	84	51	41	150	28	R-7069

Table 3b.--Major and minor oxide and trace element composition of the laboratory ash of 17 bituminous coal samples from Dickenson County, Virginia--continued

Sample number	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Sample number
R-6853	8.9	12	470	4.4	67L	42	11	140	41	8.9	R-6853
R-6854	35	14	1,100	10	150L	15	25	490	240	25	R-6854
R-6857	28	2.0L	6,100	3.1	94	38	9.4	200	200	13	R-6857
R-6861	19	10	1,400	.83L	33	3.0L	27	180	110	8.3	R-6861
R-6862	13	2.0L	940	2.2	17	3.0L	10	240	50	5.7	R-6862
R-6865	19	20	750	3.6	48	10L	57	110	51	9.6	R-6865
R-6866	32	7.0L	640	6.4	38L	10L	32	230	160	18	R-6866
R-6867	47	20	1,700	10	100L	10L	67	130	150	20	R-6867
R-6873	15	7.0L	530	2.2	29	10L	14	170	38	6.5	R-6873
R-6874	17	7.0L	350	2.5	32	10L	13	150	44	7.4	R-6874
R-6875	16	2.0L	1,800	3.2	32L	3.0L	11	120	110	7.5	R-6875
R-6920	25	2.0L	1,200	3.9	59L	4.0	24	120	58	14	R-6920
R-6922	14	6.0	310	2.0	39	3.0L	12	100	27	7.5	R-6922
R-6941	13	10	220	1.8	18L	10L	7.0	130	44	7.0	R-6941
R-6943	16	2.0	1,600	2.3	35L	4.0	22	130	72	7.0	R-6943
R-6944	12	8.0	410	1.8	47	3.0L	10	130	44	7.2	R-6944
R-7069	13	7.0L	490	2.1	27	3.0L	11	150	60	6.9	R-7069

Table 3b. --Major and minor oxide and trace element composition of the laboratory ash of 17 bituminous coal samples from
Dickenson County, Virginia--continued

Sample number	Zn (ppm)	Zr-S (ppm)
R-6853	85	110
R-6854	180	220
R-6857	88	380
R-6861	52	1,100
R-6862	66	140
R-6865	42	190
R-6866	250	110
R-6867	51	200
R-6873	160	110
R-6874	45	130
R-6875	38	430
R-6920	130	79
R-6922	51	200
R-6941	120	79
R-6943	59	230
R-6944	55	150
R-7069	76	190

Table 3c.--Major and minor oxide and trace element composition of the laboratory ash of 1 bituminous coal sample from Lee County, 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 spectrographic 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
R-6923	5.2	46	29	1.8	1.6	0.52	3.2	9.2	1.1	0.07	R-6923

Table 3c.--Major and minor oxide and trace element composition of the laboratory ash of 1 bituminous coal sample from Lee County, Virginia--continued

Sample number	S03 (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
R-6923	3.1	0.20	160	860	21	1.1	170	140	170	15	R-6923

Table 3c.--Major and minor oxide and trace element composition of the laboratory ash of 1 bituminous coal sample from Lee County, Virginia--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
R-6923	270	3.7	25	10	14	3.8	96	130	2	320	R-6923

Table 3c.--Major and minor oxide and trace element composition of the laboratory ash of 1 bituminous coal sample from Lee County, Virginia--continued

Sample number	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Rb (ppm)	Sc (ppm)	Sm (ppm)	Sr-S (ppm)	Tb (ppm)	Sample number
R-6923	6.0	6	62	110	63	210	33	19	2,100	3.8	R-6923

Table 3c.--Major and minor oxide and trace element composition of the laboratory ash of 1 bituminous coal sample from Lee County, Virginia--continued

Sample number	Tl-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
R-6923	5.0	23	75	37	9.6	240	52	R-6923

Table 3d.--Major and minor oxide and trace element composition of the laboratory ash of 17 bituminous coal samples from Russell County, 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 spectrographic 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)	S102 (percent)	Al2O3 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
R-6852	9.4	49	23	3.1	1.6	0.22	3.5	10	1.4	0.09	R-6852
R-6856	22.2	53	22	1.2	1.8	.17	5.0	8.5	1.1	.07	R-6856
R-6863	11.4	42	18	10	1.1	1.2	2.3	6.5	.94	.04	R-6863
R-6864	29.6	57	23	3.6	.23	.41	3.4	4.0	1.4	.11	R-6864
R-6869	13.8	38	18	15	1.8	.91	.91	5.7	1.4	.08	R-6869
R-6870	17.6	46	18	13	.80	.18	1.4	4.6	1.7	.12	R-6870
R-6886	15.1	50	23	2.9	1.2	.24	2.6	8.3	1.4	.10	R-6886
R-6887	7.0	49	24	2.3	1.2	.83	.48	8.1	2.0	.08	R-6887
R-6888	7.4	46	23	2.8	1.1	.50	1.8	10	1.5	.11	R-6888
R-6917	16.4	52	28	1.6	1.1	.25	3.1	7.0	1.4	.04	R-6917
R-6918	41.6	57	19	5.6	1.0	.23	3.1	3.2	1.7	.02	R-6918
R-6919	11.2	36	18	17	1.1	.24	.97	5.9	1.3	.28	R-6919
R-6945	8.4	39	24	9.0	1.6	.96	3.6	9.0	1.0	.04	R-6945
R-6946	4.3	33	21	9.5	2.0	1.3	2.3	15	.85	.06	R-6946
R-6947	4.1	34	21	17	1.8	.66	2.5	19	.94	.07	R-6947
R-6948	6.3	41	22	7.9	1.5	.64	2.6	10	1.2	.05	R-6948
R-7161	4.0	40	26	6.4	.88	.34	.52	14	1.1	.13	R-7161

Table 3d.--Major and minor oxide and trace element composition of the laboratory ash of 17 bituminous coal samples from Russell County, Virginia--continued

Sample number	SO ₃ (percent)	Ag-S (ppm)	Au-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Sample number
R-6852	4.1	0.10	10L	110	500	25	0.40	130	33	120	R-6852
R-6856	1.8	.10	10L	120	550	8.0	.36	99	35	90	R-6856
R-6863	8.0	.10	10L	180	1,100	16	.34	140	37	90	R-6863
R-6864	2.2	.10	10L	130	870	8.0	.28	120	18	110	R-6864
R-6869	8.8	.10	10L	280	1,100	10	.20	160	55	99	R-6869
R-6870	5.4	.10L	100	100	790	12	.36	160	36	130	R-6870
R-6886	4.1	.20	10L	120	770	9.0	.20	160	35	150	R-6886
R-6887	4.1	.40	10L	200	1,100	20	.30	210	56	160	R-6887
R-6888	4.4	.60	10L	140	1,200	24	.40	190	140	140	R-6888
R-6917	2.5	.10L	10L	50	470	12	.45	200	85	130	R-6917
R-6918	1.3	.10L	10L	42	410	5.0	.31	170	8.4	140	R-6918
R-6919	5.0	.10L	10L	37	430	4.0	.28	140	30	100	R-6919
R-6945	8.3	.10L	10L	98	1,500	16	.34	150	92	120	R-6945
R-6946	13	.40	10L	57	1,700	110	.34	190	120	140	R-6946
R-6947	11	.40	10L	52	1,200	160	.26	150	120	130	R-6947
R-6948	9.9	.10	10L	93	710	40	.33	170	120	98	R-6948
R-7161	9.7	.40	10L	370	530	19	.95	220	43	110	R-7161

Table 3d.--Major and minor oxide and trace element composition of the laboratory ash of 17 bituminous coal samples from Russell County, Virginia--continued

Sample number	Cs (ppm)	Cu (ppm)	Dy-S (ppm)	Er-S (ppm)	Eu (ppm)	Ga-S (ppm)	Gd-S (ppm)	Ge-S (ppm)	Hf (ppm)	La (ppm)	Sample number
R-6852	21	140	32L	10L	2.3	33	7.0L	19	5.3	64	R-6852
R-6856	15	100	32L	10L	1.7	49	7.0L	7.0	4.1	50	R-6856
R-6863	7.9	130	32L	10L	2.4	28	13	5.0L	6.1	70	R-6863
R-6864	8.7	80	32L	10L	1.9	36	8.0	5.0	7.3	63	R-6864
R-6869	4.3	150	32L	10L	2.3	28	14	5.0L	8.0	94	R-6869
R-6870	7.4	120	32L	10L	2.2	31	17	6.0	8.5	91	R-6870
R-6886	16	100	32L	10L	2.5	29	7.0L	5.0L	7.9	86	R-6886
R-6887	2.9	220	32L	13	4.1	27	17	5.0L	11	130	R-6887
R-6888	5.4	250	32L	10	3.9	52	12	18	8.1	110	R-6888
R-6917	12	160	22L	10L	3.6	24	8.0	2.0	9.8	110	R-6917
R-6918	8.2	81	22L	10L	2.2	22	8.0	2.0L	7.9	99	R-6918
R-6919	3.6	130	22L	10L	2.1	21	11	2.0L	6.3	80	R-6919
R-6945	13	250	22L	10L	2.6	26	11	16	6.0	83	R-6945
R-6946	9.3	210	22L	10L	4.0	77	12	65	9.3	93	R-6946
R-6947	9.8	200	22L	10L	4.1	100	13	160	7.3	73	R-6947
R-6948	7.9	260	22L	10L	3.2	29	11	4.0	9.5	95	R-6948
R-7161	18L	320	29	10L	3.5	28	21	3.0	7.5	150	R-7161

Table 3d.--Major and minor oxide and trace element composition of the laboratory ash of 17 bituminous coal samples from Russell County, Virginia--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Rb (ppm)	Sc (ppm)	Sample number
R-6852	170	1	250	10	15	61	53	35	260	23	R-6852
R-6856	140	.5	320	6.0	13	63	60	37	220	18	R-6856
R-6863	72	.9	320	10	25	80	56	33	200L	21	R-6863
R-6864	180	.7	130	4.0	29	75	43	36	170	24	R-6864
R-6869	160	.7	500	10	39	66	51	41	170L	22	R-6869
R-6870	160	1	590	9.0	50	88	57	44	110	26	R-6870
R-6886	140	1	220	5.0	23	59	48	25	210	28	R-6886
R-6887	180	1	140	14	38	140	79	42	240L	34	R-6887
R-6888	130	1	210	20	16	64	130	58	230L	43	R-6888
R-6917	150	1	1,300	7.0	5	61	76	59	180	29	R-6917
R-6918	130	1	290	2.0L	8	46L	16	48	180	27	R-6918
R-6919	110	.9	750	5.0	7	46L	35	40	200L	24	R-6919
R-6945	150	1	530	6.0	12	46L	65	68	190	40	R-6945
R-6946	170	2	860	8.0	7	46L	110	81	440L	33	R-6946
R-6947	220	2	1,800	9.0	14	46L	130	140	460L	34	R-6947
R-6948	170	2	460	5.0	10	46L	72	64	320L	24	R-6948
R-7161	150	3L	260	31	17	85	220	67	800L	30	R-7161

Table 3d.--Major and minor oxide and trace element composition of the laboratory ash of 17 bituminous coal samples from Russell County, Virginia--continued

Sample number	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Sample number
R-6852	11	8.0	470	2.1	32L	14	130	43	6.4	110	R-6852
R-6856	7.2	11	440	1.4	23	6.8	130	26	3.6	220	R-6856
R-6863	12	7.0L	890	1.8	44	6.1	130	84	6.1	40	R-6863
R-6864	8.0	14	560	1.7	35	7.0	150	49	4.2	44	R-6864
R-6869	11	8.0	4,200	1.4	43	9.4	110	62	5.1	21	R-6869
R-6870	11	13	1,100	1.7	34	11	140	80	5.1	20	R-6870
R-6886	14	7.0L	860	1.3	26	6.0	130	38	6.0	27	R-6886
R-6887	19	9.0	1,600	2.9	43L	17	160	120	10	31	R-6887
R-6888	19	11	1,800	2.7	68	16	190	75	11	120	R-6888
R-6917	20	5.0	370	2.4	24	15	120	29	8.5	83	R-6917
R-6918	13	4.0	430	1.7	29	10	81	19	5.3	33	R-6918
R-6919	12	6.0	960	1.8	27L	13	66	26	5.4	29	R-6919
R-6945	13	2.0L	1,500	2.4	36L	18	100	64	8.3	41	R-6945
R-6946	19	2.0L	3,300	4.7	70L	23	120	71	14	73	R-6946
R-6947	17	2.0L	2,800	4.9	73L	24	140	95	12	120	R-6947
R-6948	16	2.0L	2,000	3.2	48L	21	90	63	9.5	36	R-6948
R-7161	18	2.0L	4,400	2.5	75L	5.0	150	89	5.0	71	R-7161

Table 3d.--Major and minor oxide and trace element composition of the laboratory ash of 17 bituminous coal samples from Russell County, Virginia--continued

Sample number	Zr-S (ppm)
R-6852	100
R-6856	91
R-6863	240
R-6864	260
R-6869	340
R-6870	610
R-6886	120
R-6887	520
R-6888	110
R-6917	66
R-6918	76
R-6919	120
R-6945	120
R-6946	89
R-6947	150
R-6948	150
R-7161	190

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Table 3e.--Major and minor oxide and trace element composition of the laboratory ash of 71 bituminous coal samples from Wise County, 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 spectrographic 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)	S102 (percent)	A1203 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe203 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
R-6814	15.4	59	29	1.1	1.1	0.35	2.2	2.3	1.4	0.80	R-6814
R-6815	6.0	53	28	2.0	1.3	.43	1.5	8.7	1.5	1.0	R-6815
R-6816	10.2	57	29	1.5	.90	.20	1.5	3.9	1.5	1.0	R-6816
R-6817	6.9	25	10	1.1	1.2	.47	1.5	53	.40	.10	R-6817
R-6818	6.8	27	19	1.6	.70	.46	1.7	43	.80	.05	R-6818
R-6819	5.7	19	17	2.0	.61	.44	.90	54	.80	.10	R-6819
R-6820	6.8	43	14	2.1	1.5	.52	1.7	32	.50	.20	R-6820
R-6821	3.6	48	36	1.7	.90	1.1	.86	5.6	1.4	.07	R-6821
R-6822	11.2	44	24	1.4	1.1	.94	2.1	22	1.2	1.4	R-6822
R-6823	5.7	58	25	1.4	1.3	.90	2.6	6.3	1.1	.90	R-6823
R-6824	3.8	31	15	2.9	3.0	1.4	1.9	37	.50	.50	R-6824
R-6825	2.4	28	14	3.4	.93	1.7	1.4	41	.50	.08	R-6825
R-6826	4.8	44	35	2.2	1.0	.71	2.0	9.4	.90	.02	R-6826
R-6827	11.0	48	27	.53	.63	.25	2.6	15	1.2	.10	R-6827
R-6828	4.3	46	29	1.9	1.3	1.0	1.7	9.4	1.1	.10	R-6828
R-6829	5.3	38	30	1.0	.65	.51	3.0	21	.91	.11	R-6829
R-6830	13.8	37	19	1.3	.37	.24	2.0	35	1.0	.60	R-6830
R-6831	10.8	30	17	1.3	.32	.28	.70	46	1.5	.40	R-6831
R-6832	3.0	34	21	2.4	1.0	2.0	2.5	29	.70	.02	R-6832
R-6833	5.6	25	19	2.9	.68	1.0	1.2	42	1.0	.30	R-6833
R-6834	2.7	43	29	2.1	.30	.88	.50	18	1.6	.40	R-6834
R-6835	9.4	60	24	2.4	.73	.57	1.3	3.4	1.6	1.5	R-6835
R-6836	4.3	42	27	2.3	.33	.39	1.1	13	1.1	.04	R-6836
R-6837	7.7	49	25	3.0	.43	.39	1.5	9.1	2.3	1.6	R-6837
R-6838	5.1	30	19	4.1	1.4	1.4	1.9	28	1.0	.10	R-6838
R-6839	4.2	53	30	1.5	.50	.35	1.8	4.1	1.4	.15	R-6839
R-6840	2.5	45	30	2.2	.85	2.8	1.4	6.0	1.7	.19	R-6840
R-6841	9.9	56	27	1.0	.68	.29	4.6	5.9	1.9	.27	R-6841
R-6842	3.4	41	16	1.9	.95	1.5	2.5	23	.56	.16	R-6842
R-6844	6.1	47	33	2.3	.70	.88	1.6	4.1	.96	1.6	R-6844
R-6845	13.6	13	8.0	6.6	2.0	.76	.93	48	.43	.10	R-6845
R-6846	8.4	36	27	6.9	1.3	.64	2.7	8.4	1.1	.14	R-6846
R-6847	9.6	56	25	1.2	.95	.50	1.8	7.5	1.6	.37	R-6847
R-6848	18.8	47	22	.65	1.2	.29	3.8	17	.98	.05	R-6848
R-6849	7.1	54	24	2.3	.58	.61	.89	8.8	1.6	1.3	R-6849
R-6850	7.5	32	14	1.9	.48	.19	1.1	42	1.1	.78	R-6850
R-6851	13.4	43	28	1.0	.76	.20	2.4	18	1.0	.08	R-6851
R-6855	10.6	32	18	1.2	.80	.22	1.8	38	.69	.27	R-6855
R-6858	5.1	49	28	2.9	.51	.69	2.2	6.4	1.2	.05	R-6858
R-6859	32.6	57	28	.21	1.2	.29	4.2	4.1	1.2	.08	R-6859

Table 3e.--Major and minor oxide and trace element composition of the laboratory ash of 71 bituminous coal samples from Wise County, Virginia--continued

Sample number	S03 (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
R-6814	1.5	0.25	180	1,200	15	0.50	160	56	140	10	R-6814
R-6815	3.3	.20	180	1,300	38	1.6	100	130	92	5.0	R-6815
R-6816	2.2	.71	160	1,500	43	1.5	250	110	170	4.9	R-6816
R-6817	3.9	.45	170	600	22	.92	58	28	61	4.3	R-6817
R-6818	3.6	.52	180	1,200	25	1.0	120	46	110	5.9	R-6818
R-6819	4.3	.74	200	1,600	40	1.1	110	40	88	3.5	R-6819
R-6820	5.0	.47	330	1,400	22	.72	210	47	160	5.9	R-6820
R-6821	2.7	.76	310	1,600	96	1.9	250	260	160	2.8	R-6821
R-6822	2.2	.56	120	1,400	24	1.3	150	58	130	8.9	R-6822
R-6823	2.9	1.4	240	1,300	92	2.0	280	360	220	7.0	R-6823
R-6824	7.7	.20L	260	1,700	24	1.0	110	140	110	7.9	R-6824
R-6825	8.2	.86	340	1,600	56	4.3	170	510	170	4.2	R-6825
R-6826	4.3	1.3	400	1,800	54	1.1	310	120	140	6.3	R-6826
R-6827	.84	.30	89	580	40	.80	190	54	140	19	R-6827
R-6828	4.2	.76	400	2,000	54	.56	260	37	110	4.7	R-6828
R-6829	1.5	.40	170	810	37	1.3	170	34	150	13	R-6829
R-6830	2.3	.66	66	580	22	1.2	140	38	110	6.5	R-6830
R-6831	2.4	.54	130	1,100	8.6	.62	130	40	120	2.8	R-6831
R-6832	7.7	.74	440	1,900	38	1.5	170	140	160	10	R-6832
R-6833	6.0	.60	240	2,400	26	1.2	110	73	120	7.1	R-6833
R-6834	3.4	1.2	260	1,800	19	1.0	300	63	150	3.7	R-6834
R-6835	1.8	.20	150	1,100	15	1.0	260	69	190	5.3	R-6835
R-6836	3.1	1.1	240	980	41	3.8	400	100	150	4.7	R-6836
R-6837	2.9	.30	160	2,100	21	1.2	250	150	220	5.2	R-6837
R-6838	6.9	.60	540	1,600	8.0	1.7	140	43	130	9.8	R-6838
R-6839	2.7	1.0	170	4,900	55	.56	190	320	150	4.8	R-6839
R-6840	4.4	.90	410	2,200	36	2.2	400	280	620	20L	R-6840
R-6841	1.2	.40	120	410	18	1.1	220	79	190	5.1	R-6841
R-6842	4.0	.50	300	1,300	35	1.6	120	85	88	.6	R-6842
R-6844	1.7	.70	220	1,600	60	1.7	340	140	200	66	R-6844
R-6845	13	.40	H	490	6.0	.83	81	29	64	2.9	R-6845
R-6846	.99	.40	200	1,000	19	3.5	270	73	150	9.5	R-6846
R-6847	1.5	.30	150	640	18	1.2	180	36	130	8.3	R-6847
R-6848	1.1	.30	150	490	13	1.2	140	59	130	9.0	R-6848
R-6849	2.4	.50	210	1,600	21	.90	210	61	150	2.8	R-6849
R-6850	1.8	.50	100	830	17	.72	110	56	99	2.7	R-6850
R-6851	.96	.80	110	850	17	3.5	280	50	150	9.7	R-6851
R-6855	1.6	.40	91	340	18	.94	110	120	100	2.8	R-6855
R-6858	5.0	.60	250	820	22	.72	290	76	140	7.8	R-6858
R-6859	.01L	.10L	110	600	11	.77	180	45	130	9.5	R-6859

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Table 3e.--Major and minor oxide and trace element composition of the laboratory ash of 71 bituminous coal samples from Wise County, 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)	Ho-S (ppm)	La (ppm)	Sample number
R-6814	120	58L	18L	2.6	43	13	8.3L	6.5	12L	91	R-6814
R-6815	270	58L	18L	2.8	36	20	12	5.0	12L	50	R-6815
R-6816	200	58L	27	5.6	47	31	8.3L	7.8	12L	140	R-6816
R-6817	180	58L	18L	1.4	29	20	8.3L	2.9	12L	29	R-6817
R-6818	160	58L	18L	2.5	49	12L	45	4.4	12L	59	R-6818
R-6819	180	58L	18L	2.3	45	12L	27	3.5	12L	53	R-6819
R-6820	170	58L	18L	3.4	52	12L	8.3L	8.8	12L	120	R-6820
R-6821	420	58L	22	6.9	83	20	100	8.3	12L	140	R-6821
R-6822	200	58L	18L	3.5	51	12L	13	5.4	12L	80	R-6822
R-6823	380	58L	33	8.1	85	29	100	7.0	12L	120	R-6823
R-6824	280	64L	20L	3.2	52	15	18	2.6	14L	53	R-6824
R-6825	480	64L	20L	5.0	64	26	50	8.3	14L	83	R-6825
R-6826	320	64L	24	5.6	62	24	9.2L	8.3	14L	150	R-6826
R-6827	160	25	10L	3.7	48	19	12	6.4	7.0L	100	R-6827
R-6828	160	64L	20L	3.5	60	22	9.2L	14	14L	120	R-6828
R-6829	230	28	10	3.8	66	22	7.0	5.7	7.0L	94	R-6829
R-6830	150	64L	20L	2.6	46	14L	15	5.1	14L	72	R-6830
R-6831	140	64L	20L	2.4	48	14L	9.6	8.3	14L	74	R-6831
R-6832	310	64L	20L	3.0	54	14	9.2L	3.3	14L	67	R-6832
R-6833	190	64L	20L	2.7	54	20	24	5.4	14L	71	R-6833
R-6834	340	64L	20L	5.6	46	20	9.2L	11	14L	190	R-6834
R-6835	150	32L	10	3.2	48	7.0L	14	12	7.0L	150	R-6835
R-6836	410	32L	16	7.9	59	8.0	31	9.3	7.0L	190	R-6836
R-6837	190	32L	12	4.4	57	7.0L	32	12	7.0L	130	R-6837
R-6838	190	32L	10L	2.9	41	13	6.0	5.9	7.0L	78	R-6838
R-6839	240	32L	16	4.5	88	19	79	9.5	10L	95	R-6839
R-6840	400	32L	13	11	62	17	31	16	7.0L	120	R-6840
R-6841	170	32L	10	4.1	42	7.0L	12	10	7.0L	120	R-6841
R-6842	390	32L	11	4.4	54	21	28	18	7.0L	59	R-6842
R-6844	260	34	18	6.6	78	27	49	6.6	8.0	200	R-6844
R-6845	91	32L	10L	2.1	22	15	19	2.2	7.0L	44	R-6845
R-6846	200	22L	12	6.2	41	25	5.0	6.0	7.0L	140	R-6846
R-6847	160	32L	10L	2.4	47	12	14	7.3	7.0L	94	R-6847
R-6848	150	32L	10L	2.4	46	7.0L	7.0	4.3	7.0L	90	R-6848
R-6849	150	32L	15	3.5	56	14	10	9.9	10L	110	R-6849
R-6850	140	32L	10L	2.0	52	18	23	5.3	7.0L	53	R-6850
R-6851	240	26	12	5.4	48	21	2.0L	6.0	7.0L	160	R-6851
R-6855	180	32L	10L	2.8	36	7.0L	12	2.8	7.0L	66	R-6855
R-6858	180	32L	17	6.9	35	19	5.0	14	7.0L	140	R-6858
R-6859	85	22L	10L	3.0	39	16	2.0L	6.1	7.0L	100	R-6859

Table 3e.--Major and minor oxide and trace element composition of the laboratory ash of 71 bituminous coal samples from Wise County, Virginia--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Rb (ppm)	Sc (ppm)	Sample number
R-6814	250	0.6	80	8.5	42	150	120	44	140	28	R-6814
R-6815	56	2	1,300	34	9	83L	150	23	220L	25	R-6815
R-6816	200	2	80	24	38	340	220	58	140L	35	R-6816
R-6817	46	1	280	36	6L	83L	58	12	140L	19	R-6817
R-6818	120	1	290	27	14	87	94	24	120	31	R-6818
R-6819	97	2	180	36	13	83L	67	22	190L	26	R-6819
R-6820	120	1	11	18	17	150	120	44	220L	31	R-6820
R-6821	90	3	220	33	24	250	290	72	310L	47	R-6821
R-6822	97	2	64	38	13	87	180	44	130	30	R-6822
R-6823	110	5	130	36	18	360	360	76	260L	53	R-6823
R-6824	51	3	730	52	7	92L	160	23	290L	47	R-6824
R-6825	37	4	250	100	14	130	580	46	460L	54	R-6825
R-6826	180	2	97	44	22	280	170	110	270L	40	R-6826
R-6827	170	2	80	11	36	120	110	47	250	35	R-6827
R-6828	130	2	150	54	66	200	120	110	280L	33	R-6828
R-6829	130	2	220	30	29	130	78	59	570	45	R-6829
R-6830	110	1	220	30	9	92L	120	46	140	30	R-6830
R-6831	81	.9	120	26	24	92L	90	24	130L	25	R-6831
R-6832	69	3	120	92	6L	92L	220	56	400L	43	R-6832
R-6833	61	2	270	26	14	94	96	18	250L	34	R-6833
R-6834	110	4	180	34	34	200	150	84	370L	33	R-6834
R-6835	170	2	180	10	22	46L	66	49	260L	37	R-6835
R-6836	190	2	290	36	22	49	150	86	350L	49	R-6836
R-6837	140	3	320	31	28	50	200	140	250L	49	R-6837
R-6838	50	2	450	19	10	46L	53	1,200	290L	27	R-6838
R-6839	110	2	90	37	22	150	330	28	240	55	R-6839
R-6840	250	4	320	32	20	46L	300	75	880L	76	R-6840
R-6841	150	2	140	15	31	46L	100	80	190L	43	R-6841
R-6842	70	3	210	66	12	76	130	46	710L	44	R-6842
R-6844	160	3	78	26	28	200	250	59	330L	57	R-6844
R-6845	330	.7	230	20	8	46L	44	10L	130L	15	R-6845
R-6846	180	2	430	11	15	130	240	54	180	37	R-6846
R-6847	270	1	130	12	32	94	92	53	280L	30	R-6847
R-6848	210	1	100	19	5	46L	110	47	160	30	R-6848
R-6849	100	1	50	16	22	73	160	45	390L	39	R-6849
R-6850	130	1	250	20	16	51	87	72	150L	24	R-6850
R-6851	290	1	62	28	13	150	160	1	160	31	R-6851
R-6855	160	2	190	30	11	60	180	59	150L	27	R-6855
R-6858	160	2	98	19	16	210	120	56	140	33	R-6858
R-6859	230	1	140	2.0L	24	110	120	37	230	29	R-6859

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Table 3e.--Major and minor oxide and trace element composition of the laboratory ash of 71 bituminous coal samples from Wise County, Virginia--continued

Sample number	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Tl-S (ppm)	Tm (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Sample number
R-6814	14	12L	2,200	1.9	32	18L	8.3L	7.8	250	98	R-6814
R-6815	12	12L	1,000	1.7	50L	47	8.3L	13	140	89	R-6815
R-6816	28	12L	2,700	4.9	59	18L	8.3L	8.8	330	250	R-6816
R-6817	12	12L	760	2.9	43L	18L	8.3L	16	130	49	R-6817
R-6818	12	12L	1,000	1.5	44L	18L	8.3L	10	140	54	R-6818
R-6819	11	12L	1,700	1.8	53L	18L	8.3L	12	94	69	R-6819
R-6820	19	12L	2,700	2.9	44L	18L	8.3L	19	250	89	R-6820
R-6821	31	12L	1,600	5.6	83	18L	8.3L	8.3	310	200	R-6821
R-6822	14	12L	1,800	2.7	27L	18L	8.3L	20	220	62	R-6822
R-6823	37	12L	690	7.0	53	18L	8.3L	12	420	310	R-6823
R-6824	13	14L	1,300	2.6	79L	20L	9.2L	13	140	60	R-6824
R-6825	35	20	1,700	4.2	120L	20L	9.2L	21	170	160	R-6825
R-6826	25	24	3,000	6.3	63L	20L	9.2L	27	260	180	R-6826
R-6827	18	2.0L	1,200	3.6	27	21	5.0L	11	250	130	R-6827
R-6828	23	17	4,400	4.7	70L	20L	9.2L	33	170	170	R-6828
R-6829	19	2.0L	1,300	3.8	57L	3.0L	5.0L	32	320	150	R-6829
R-6830	12	14L	800	2.9	22	20L	9.2L	11	170	64	R-6830
R-6831	11	14L	1,500	1.9	37	20L	9.2L	15	140	52	R-6831
R-6832	17	19	1,900	3.3	100L	20L	9.2L	13	240	110	R-6832
R-6833	11	14L	2,400	1.8	54L	58	9.2L	11	110	58	R-6833
R-6834	26	58	3,200	3.7	110L	20L	9.2L	15	190	120	R-6834
R-6835	20	7.0L	1,800	3.2	32L	10L	5.0L	17	180	27	R-6835
R-6836	44	15	1,800	9.3	70L	32	5.0L	19	150	75	R-6836
R-6837	22	42	1,000	3.9	39L	10	5.0L	32	220	62	R-6837
R-6838	14	280	1,200	9.8L	59L	10L	5.0L	25	96	35	R-6838
R-6839	19	17	490	2.4	71L	10L	5.0L	21	280	150	R-6839
R-6840	24	7.0L	1,600	24L	120L	12	5.0L	16	130	77	R-6840
R-6841	21	7.0L	430	3.0	40	10L	5.0L	33	180	46	R-6841
R-6842	15	7.0L	1,300	18L	88L	26	5.0L	21	180	100	R-6842
R-6844	31	2.0L	3,600	4.9	49L	3.0L	5.0L	13	500	210	R-6844
R-6845	8.8	7.0L	380	3.7L	22L	10L	5.0L	5.9	54	21	R-6845
R-6846	32	2.0L	1,000	4.8	36L	3.0L	5.0L	23	160	130	R-6846
R-6847	16	7.0L	1,100	8.3L	31L	10L	5.0L	16	180	70	R-6847
R-6848	13	7.0L	210	3.7L	37	21	5.0L	14	150	27	R-6848
R-6849	17	7.0L	2,200	11L	42L	11	7.0	17	220	86	R-6849
R-6850	8.0	11	600	4.0L	40L	10L	5.0L	11	91	30	R-6850
R-6851	26	2.0L	2,300	4.5	22L	3.0L	5.0L	17	250	120	R-6851
R-6855	13	12	470	1.9	28L	10L	5.0L	25	170	76	R-6855
R-6858	31	7.0L	790	5.9	59L	10L	5.0L	18	200	140	R-6858
R-6859	17	2.0L	460	2.5	28	3.0L	5.0L	8.6	260	85	R-6859

Table 3e.--Major and minor oxide and trace element composition of the laboratory ash of 71 bituminous coal samples from Wise County, Virginia--continued

Sample number	Yb (ppm)	Zn (ppm)	Zr-S (ppm)
R-6814	5.8	68	580
R-6815	8.3	1,200	69
R-6816	15	250	450
R-6817	4.3	400	63
R-6818	7.4	62	130
R-6819	7.0	52	140
R-6820	8.8	85	220
R-6821	19	56	240
R-6822	8.0	260	130
R-6823	25	220	180
R-6824	7.9	140	56
R-6825	17	1,400	70
R-6826	17	65	220
R-6827	10	71	360
R-6828	12	100	400
R-6829	11	110	300
R-6830	8.0	130	92
R-6831	6.5	51	220
R-6832	13	190	78
R-6833	7.1	65	130
R-6834	11	99	440
R-6835	7.4	40	110
R-6836	19	110	99
R-6837	13	120	110
R-6838	5.9	140	73
R-6839	12	280	220
R-6840	20	100	110
R-6841	10	160	170
R-6842	12	270	60
R-6844	18	640	250
R-6845	3.7	690	40
R-6846	14	380	240
R-6847	5.2	92	220
R-6848	6.4	220	46
R-6849	9.9	37	140
R-6850	4.0	180	89
R-6851	11	330	150
R-6855	8.5	92	120
R-6858	14	130	190
R-6859	6.7	150	290

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Table 3e.--Major and minor oxide and trace element composition of the laboratory ash of 71 bituminous coal samples from Wise County, Virginia--continued

Sample number	Ash (percent)	S102 (percent)	A1203 (percent)	CaO (percent)	MgO (percent)	Na2O (percent)	K2O (percent)	Fe2O3 (percent)	TiO2 (percent)	P2O5 (percent)	Sample number
R-6860	6.1	52	31	1.6	0.81	0.41	2.5	7.3	2.1	0.43	R-6860
R-6868	10.9	43	24	5.4	2.0	.49	2.7	8.6	1.2	.12	R-6868
R-6871	10.7	52	29	.85	.71	.27	2.1	9.0	1.5	.12	R-6871
R-6872	15.1	41	20	14	1.1	.33	.69	7.0	1.4	.34	R-6872
R-6908	8.4	42	33	2.8	.81	.48	3.2	5.8	1.5	2.2	R-6908
R-6909	6.4	21	18	2.8	.83	.42	1.7	37	.82	.07	R-6909
R-6910	2.5	49	24	2.8	.88	1.6	.38	8.3	2.0	.05	R-6910
R-6911	7.8	53	30	.69	.68	.35	2.7	5.6	1.8	.07	R-6911
R-6912	5.1	48	27	4.3	.66	.79	1.2	3.9	1.7	3.5	R-6912
R-6913	5.9	52	31	1.3	.60	.46	2.4	4.0	1.5	.04	R-6913
R-6914	14.2	55	30	.65	1.3	.28	4.0	4.3	1.2	.10	R-6914
R-6915	13.3	58	27	.67	.96	.30	3.4	5.2	1.2	.06	R-6915
R-6916	7.7	56	26	1.4	.95	.70	2.5	3.8	1.5	.07	R-6916
R-6934	2.1	B	B	B	1.3	1.3	B	B	B	B	R-6934
R-6935	3.4	46	29	1.9	.98	1.6	1.6	8.9	1.7	.06	R-6935
R-6936	21.8	55	33	.56	.91	.43	4.6	2.6	1.3	.07	R-6936
R-6937	7.9	50	25	3.8	.99	.85	2.2	6.6	1.4	.06	R-6937
R-6938	10.7	26	15	1.2	.66	.38	1.4	41	.86	.06	R-6938
R-6939	5.8	31	22	1.7	.55	.70	1.0	29	1.4	.66	R-6939
R-6940	17.4	53	30	.67	1.0	.54	4.3	4.5	1.2	.06	R-6940
R-7068	6.4	39	23	2.2	.68	.21	1.1	28	1.3	.54	R-7068
R-7070	5.4	42	22	1.5	.68	.25	1.8	27	1.1	.21	R-7070
R-7071	4.7	54	30	1.3	.45	.57	.88	6.3	1.8	.37	R-7071
R-7072	10.6	50	26	2.1	1.6	.25	3.1	8.9	1.3	.08	R-7072
R-7073	9.3	48	28	3.0	1.5	.29	2.9	7.9	1.3	.16	R-7073
R-7160	2.3	39	23	5.5	.76	1.2	.80	19	1.0	.17	R-7160
R-7168	3.5	35	28	3.5	.88	1.5	1.1	21	1.5	.31	R-7168
R-7169	6.1	48	26	1.2	.91	.44	3.3	12	1.1	.12	R-7169
R-7171	4.3	31	20	6.3	2.0	2.2	1.2	13	1.1	.00	R-7171
R-7174	5.6	52	21	2.6	.78	.48	1.2	10	1.7	.02	R-7174
R-7175	4.9	51	27	2.6	.51	.55	1.4	6.6	1.5	.10	R-7175

Table 3e.--Major and minor oxide and trace element composition of the laboratory ash of 71 bituminous coal samples from Wise County, Virginia--continued

Sample number	SO ₃ (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
R-6860	1.6	0.50	210	890	17	0.88	230	95	160	6.6	R-6860
R-6868	6.1	.10L	350	1,100	13	.46	110	23	100	16	R-6868
R-6871	1.3	.20	93	390	25	.70	280	130	150	4.7	R-6871
R-6872	9.1	.10L	200	700	9.0	.20	170	29	120	3.3	R-6872
R-6908	3.2	.40	170	2,100	11	1.5	260	86	180	11	R-6908
R-6909	5.1	.40	380	1,500	27	1.6	410	240	330	9.4	R-6909
R-6910	4.2	.70	230	1,300	62	.64	240	260	150	32L	R-6910
R-6911	.79	.60	150	640	21	1.0	64	28	73	3.8	R-6911
R-6912	3.1	.60	310	2,700	19	2.8	250	310	180	5.9	R-6912
R-6913	2.1	.30	84	610	37	.40	240	240	170	8.5	R-6913
R-6914	.76	.10	71	580	9.0	.67	160	38	160	11	R-6914
R-6915	.97	.20	87	630	12	.54	98	14	59	6.8	R-6915
R-6916	2.1	.70	230	1,300	16	.90	230	30	130	16	R-6916
R-6934	B	.50	630	1,000	24	1.7	330	120	180	14	R-6934
R-6935	3.9	.70	260	1,400	32	1.1	240	190	130	8.8	R-6935
R-6936	.72	.40	130	890	15	.48	170	58	160	9.2	R-6936
R-6937	5.4	2.5	200	2,400	10	3.4	230	140	130	7.6	R-6937
R-6938	2.1	.60	180	740	10	2.8	110	21	110	7.5	R-6938
R-6939	2.3	.30	160	630	14	2.0	170	200	150	5.2	R-6939
R-6940	1.0	.40	110	1,000	9.0	.57	180	35	120	16	R-6940
R-7068	2.9	.40	290	470	9.0	1.3	160	72	140	3.1	R-7068
R-7070	2.7	.20	120	410	15	.23	170	22	150	5.6	R-7070
R-7071	1.7	.30	110	510	53	1.2	280	160	160	2.1	R-7071
R-7072	3.7	.20	120	510	19	.56	220	110	160	11	R-7072
R-7073	5.1	.10	170	580	13	.95	260	100	230	11	R-7073
R-7160	9.4	.40	260	680	22	1.2	87	290	220L	4.3	R-7160
R-7168	6.6	.80	370	1,100	17	2.6	260	250	180	11	R-7168
R-7169	2.1	.70	140	820	28	3.5	180	180	180	9.8	R-7169
R-7171	15	.40	170	5,700	16	.88	160	280	140	9.3	R-7171
R-7174	4.7	.20	130	1,300	45	.98	290	80	170	5.4	R-7174
R-7175	2.0	.40	160	3,000	30	1.3	240	200	150	6.1	R-7175

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Table 3e.--Major and minor oxide and trace element composition of the laboratory ash of 71 bituminous coal samples from Wise County, 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)	Ho-S (ppm)	La (ppm)	Sample number
R-6860	260	32L	16	3.3	50	12	8.0	9.8	7.0L	130	R-6860
R-6868	130	23	10L	2.1	38	13	4.0	5.5	7.0L	64	R-6868
R-6871	250	32L	10L	3.5	37	7.0	15	8.4	7.0L	150	R-6871
R-6872	150	32L	10L	2.3	25	10	5.0L	7.9	7.0L	99	R-6872
R-6908	310	32L	10L	4.6	53	8.0	24	8.3	7.0L	140	R-6908
R-6909	220	32L	10L	8.3	59	7.0L	110	16	7.0L	220	R-6909
R-6910	420	32L	10L	4.8	61	22	41	12	7.0L	160	R-6910
R-6911	270	32L	10L	1.3	77	7.0L	27	5.1	7.0L	38	R-6911
R-6912	220	32L	12	4.3	48	17	28	9.8	7.0L	160	R-6912
R-6913	270	22L	10L	5.9	31	12	22	6.8	7.0L	120	R-6913
R-6914	140	22L	10L	2.7	25	9.0	2.0L	5.6	7.0L	99	R-6914
R-6915	140	22L	10L	1.3	27	11	2.0	3.0	7.0L	60	R-6915
R-6916	230	32L	10L	4.8	52	7.0L	5.0	10	7.0L	130	R-6916
R-6934	450	22L	10L	8.1	57	16	7.0	14L	7.0L	140	R-6934
R-6935	350	23	12	4.4	67	16	19	12	7.0L	150	R-6935
R-6936	170	32L	10L	3.0	54	8.0	5.0L	6.9	7.0L	92	R-6936
R-6937	350	32L	10L	4.8	53	13	5.0L	8.9	7.0L	130	R-6937
R-6938	150	32L	10L	2.1	31	7.0L	7.0	4.7	7.0L	56	R-6938
R-6939	140	32L	10L	3.4	51	15	20	6.9	7.0L	86	R-6939
R-6940	140	32L	12	2.9	49	11	5.0	6.3	7.0L	98	R-6940
R-7068	200	22L	10L	3.0	31	7.0L	7.0	7.8	7.0L	78	R-7068
R-7070	110	22L	10L	3.0	41	13	46	7.4	7.0L	93	R-7070
R-7071	310	22L	12	5.5	56	21	32	13	7.0L	150	R-7071
R-7072	210	22L	10L	4.9	33	14	10	6.6	7.0L	100	R-7072
R-7073	260	22L	12	5.6	34	11	2.0L	6.5	7.0L	120	R-7073
R-7160	370	22L	10L	3.5	27	18	8.0	17L	7.0L	43	R-7160
R-7168	370	23	11	6.9	42	17	32	11	7.0L	140	R-7168
R-7169	430	26	15	5.1	49	19	16	6.6	8.0	110	R-7169
R-7171	170	22L	10L	2.8	61	14	84	7.0	7.0L	93	R-7171
R-7174	230	30	10L	5.5	42	16	3.0	13	15L	160	R-7174
R-7175	220	31	11	4.3	41	18	49	10	7.0L	120	R-7175

Table 3e.--Major and minor oxide and trace element composition of the laboratory ash of 71 bituminous coal samples from Wise County, Virginia--continued

Sample number	Li (ppm)	Lu (ppm)	Mn (ppm)	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	Pb (ppm)	Rb (ppm)	Sc (ppm)	Sample number
R-6860	160	2	80	20	30	130	150	77	230L	46	R-6860
R-6868	180	.9	260	17	14	46L	66	30	220	24	R-6868
R-6871	210	2	490	9.0	11	46L	140	90	120	26	R-6871
R-6872	160	1	310	16	15	46L	50	26	46	27	R-6872
R-6908	180	1	140	10	12	90	120	100	540L	40	R-6908
R-6909	120	2	370	24	13	46L	78	31	420L	64	R-6909
R-6910	92	4	530	15	40	110	420	70	1,300L	36	R-6910
R-6911	310	1	73	18	15	62	160	120	270L	24	R-6911
R-6912	110	2	59	15	40	79	370	56	650L	37	R-6912
R-6913	170	2	56	2.0L	10	77	130	100	460L	46	R-6913
R-6914	160	1	98	5.0	7	56	65	67	350	30	R-6914
R-6915	75	.8	75	6.0	10	73	65	59	140	15	R-6915
R-6916	200	1	66	9.0	16	55	68	80	160	34	R-6916
R-6934	90	5	890	39	8	48	120	78	620L	71	R-6934
R-6935	130	3	270	31	28	81	220	100	440L	50	R-6935
R-6936	230	.9	140	6.0	21	130	71	84	200	34	R-6936
R-6937	130	1	540	11	10	46L	330	93	370L	29	R-6937
R-6938	81	.9	170	110	27	69	64	24	260L	18	R-6938
R-6939	81	2	150	15	21	46L	180	35	690L	43	R-6939
R-6940	110	1	160	5.0	16	110	73	60	330L	30	R-6940
R-7068	120	2	83	23	21	82	95	58	780L	27	R-7068
R-7070	210	2	200	28	21	72	69	51	330L	37	R-7070
R-7071	260	2	52	26	33	110	270	94	320L	55	R-7071
R-7072	320	2	200	11	15	95	110	66	180	42	R-7072
R-7073	280	2	250	11	12	86	100	82	260L	59	R-7073
R-7160	130	4	280	28	10	53	190	58	1,000L	48	R-7160
R-7168	120	3	160	36	16	130	290	82	940L	66	R-7168
R-7169	160	3	96	34	11	110	180	88	520L	57	R-7169
R-7171	140	2	260	16	13	49	180	18	1,400L	30	R-7171
R-7174	130	2	510	8.0	40	150	150	84	710L	45	R-7174
R-7175	160	2	60	27	36	110	340	84	820L	39	R-7175

Table 3e.--Major and minor oxide and trace element composition of the laboratory ash of 71 bituminous coal samples from Wise County, Virginia--continued

Sample number	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	Ti-S (ppm)	Tm (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Sample number
R-6860	18	13	1,100	3.3	49L	10L	5.0L	20	210	92	R-6860
R-6868	10	2.0L	3,400	1.8	28	3.0L	5.0L	9.2	180	76	R-6868
R-6871	24	7.0L	400	3.7	28L	10L	5.0L	21	180	45	R-6871
R-6872	13	7.0L	1,200	2.0	33	10L	5.0L	12	130	40	R-6872
R-6908	24	13	2,900	3.6	36L	12	5.0L	23	210	53	R-6908
R-6909	36	8.0	1,300	6.3	47L	10L	5.0L	38	100	48	R-6909
R-6910	24	7.0L	2,300	4.0	120L	15L	5.0L	36	170	110	R-6910
R-6911	6.4	7.0L	530	6.4L	38L	15	5.0L	10	210	39	R-6911
R-6912	22	7.0L	5,200	9.8L	59L	10L	5.0L	24	230	110	R-6912
R-6913	29	3.0	670	5.1	51L	3.0L	5.0L	24	110	83	R-6913
R-6914	15	3.0	280	2.1	21L	3.0L	5.0L	15	140	41	R-6914
R-6915	9.0	5.0	460	1.5	23L	3.0L	5.0L	25	120	45	R-6915
R-6916	22	7.0L	1,100	3.9	39L	10L	5.0L	21	140	38	R-6916
R-6934	38	2.0	1,200	14L	140L	3.0L	5.0L	48	200	110	R-6934
R-6935	24	4.0	1,600	2.9	88L	3.0L	5.0L	41	150	94	R-6935
R-6936	15	7.0L	250	2.3	28	10L	5.0L	13	200	66	R-6936
R-6937	22	7.0L	1,400	3.8	38L	10L	5.0L	15	94	37	R-6937
R-6938	9.3	7.0L	390	1.9	28L	10L	5.0L	18	110	47	R-6938
R-6939	16	7.0L	850	3.4	52L	21	5.0L	17	130	65	R-6939
R-6940	16	14	520	2.3	17	10L	5.0L	9.8	190	60	R-6940
R-7068	16	2.0L	1,500	9.4L	47	3.0L	5.0L	11	150	56	R-7068
R-7070	13	2.0L	690	1.9	56L	36	5.0L	26	170	52	R-7070
R-7071	26	5.0	1,300	4.3	64L	3.0L	5.0L	34	240	120	R-7071
R-7072	24	2.0	970	4.7	28L	3.0L	5.0L	15	160	92	R-7072
R-7073	27	3.0	1,000	4.3	32L	3.0L	5.0L	19	210	60	R-7073
R-7160	13	2.0L	3,200	13L	130L	3.0L	5.0L	8.7	120	81	R-7160
R-7168	29	2.0L	2,300	5.7	86L	27	5.0L	5.7	210	110	R-7168
R-7169	23	4.0	770	3.3	49L	3.0L	5.0L	9.8	450	150	R-7169
R-7171	15	2.0L	3,200L	4.7L	70L	3.0L	5.0L	9.3L	100	75	R-7171
R-7174	25	2.0L	2,600	5.4	71L	3.0L	5.0L	20	190	140	R-7174
R-7175	22	48	4,300	4.1	82L	4.0	5.0L	14	250	110	R-7175

Table 3e.--Major and minor oxide and trace element composition of the laboratory ash of 71 bituminous coal samples from Wise County, Virginia--continued

Sample number	Yb (ppm)	Zn (ppm)	Zr-S (ppm)
R-6860	9.8	79	200
R-6868	5.5	72	170
R-6871	9.3	120	100
R-6872	6.0	29	180
R-6908	11	88	91
R-6909	14	120	99
R-6910	12	91	350
R-6911	5.1	130	90
R-6912	9.8	110	290
R-6913	15	70	92
R-6914	5.6	220	100
R-6915	4.5	90	110
R-6916	9.1	120	80
R-6934	24	270	67
R-6935	15	110	270
R-6936	7.3	64	160
R-6937	10	740	110
R-6938	4.7	300	200
R-6939	12	110	190
R-6940	7.5	110	130
R-7068	6.3	79	190
R-7070	7.4	85	150
R-7071	15	250	240
R-7072	13	280	120
R-7073	13	150	65
R-7160	13	73	120
R-7168	14	260	210
R-7169	18	320	130
R-7171	9.3	76	160
R-7174	14	160	330
R-7175	10	140	410

Table 4a.--Content of 22 trace elements in 28 bituminous coal samples from Buchanan County, Virginia.

Sample number	As (ppm)	Ce (ppm)	Cl (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	Sample number
R-6876	22	8.0	760	9.4	6.3	0.7	0.20	56	0.2	0.030	R-6876
R-6877	37	27	B	16	12	1.3	.40	63	.7	.060	R-6877
R-6878	2.0	17	B	2.9	13	.6	.22	55	1.3	.040	R-6878
R-6879	22	10	B	11	7.8	1.1	.24	58	.4	.050	R-6879
R-6880	6.0	5.0	B	5.6	3.2	.4	.21	21	.3	.010L	R-6880
R-6881	88	7.0	B	5.4	4.0	.2	.25	31	.2	.13	R-6881
R-6882	13	24	B	3.8	21	.9	.43	58	1.3	.080	R-6882
R-6883	15	17	B	6.2	10	.3	.30	29	.7	.11	R-6883
R-6884	6.0	15	B	8.9	9.0	.5	.26	23	.6	.060	R-6884
R-6885	2.0	11	B	4.5	4.9	.3	.20	24	.3	.010	R-6885
R-6889	7.0	4.0	B	5.7	2.8	.2	.11	30	.1	.040	R-6889
R-6890	2.0	22	B	4.7	14	1.5	.36	74	.9	.020	R-6890
R-6891	120	15	B	4.1	11	1.8	.26	85	.4	.37	R-6891
R-6893	35	15	B	6.9	12	1.6	.28	94	.6	.17	R-6893
R-6894	8.0	15	B	3.2	9.5	.4	.25	39	.6	.13	R-6894
R-6895	110	17	B	16	9.8	1.0	.56	44	.4	.25	R-6895
R-6896	8.0	3.0	B	3.0	3.2	.2	.09	20L	.3L	.040	R-6896
R-6897	1.0	16	B	6.9	16	.4	.27	34	.7	.030	R-6897
R-6898	12	11	B	5.7	8.8	1.6	.24	66	.3	.070	R-6898
R-6899	16	5.0	B	6.9	3.5	.4	.14	20	.2	.060	R-6899
R-6900	55	18	B	7.6	18	1.4	.39	64	1.4	.16	R-6900
R-6901	38	17	B	3.9	16	2.9	.30	120	.6	.070	R-6901
R-6902	170	27	B	8.6	25	4.1	.47	200	1.1	.13	R-6902
R-6903	14	8.0	B	4.1	6.4	.9	.19	44	.2	.10	R-6903
R-6904	15	27	B	9.5	23	2.1	.41	130	1.2	.11	R-6904
R-6905	1.0	16	B	9.0	15	.4	.28	39	.7	.040	R-6905
R-6906	14	9.0	B	2.1	5.9	.2	.15	30	.4	.020	R-6906
R-6907	2.0	30	B	13	33	2.1	.49	130	1.8	.010L	R-6907

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

Table 4a.--Content of 22 trace elements in 28 bituminous coal samples from Buchanan County, Virginia--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
R-6876	4	0.1	300	21	11	2.3	2.5	1.7	0.90	0.2	R-6876
R-6877	17	.2	320	85	14	2.3	3.0	2.3	2.1	.3	R-6877
R-6878	12	.2	840	44	11	.90	2.4	1.7	1.6	.2	R-6878
R-6879	5	.2	320	56	12	2.6	3.1	1.6	1.0	.3	R-6879
R-6880	2	.1	320	11	7L	2.7	2.1	2.0	.90	.2	R-6880
R-6881	3	.1	300	16	9L	.90	2.1	3.7	1.1	.2	R-6881
R-6882	13	.2	930	140	10	1.1	4.6	4.5	2.4	.4	R-6882
R-6883	10	.1	730	77	9L	1.1	2.2	3.9	1.7	.2	R-6883
R-6884	8	.1	320	30	9L	1.1	2.0	1.2	1.5	.3	R-6884
R-6885	5	.1	49	10	7L	1.5	1.3	1.1	1.3	.2	R-6885
R-6889	2	.1	200	24	14L	1.5	1.1	2.2	.40	.1	R-6889
R-6890	12	.2	560	780	19	.60	3.4	3.1	1.8	.3	R-6890
R-6891	7	.1	430	49	19	1.5	2.6	4.2	1.3	.2	R-6891
R-6893	8	.1	400	34	22	.90	3.0	6.1	1.3	.2	R-6893
R-6894	8	.1	100	51	11L	.50	2.2	2.3	1.3	.2	R-6894
R-6895	8	.3	230	29	17L	2.2	3.2	2.2	2.3	.5	R-6895
R-6896	2	.1	300	B	16L	1.5	.80	1.3	.40	.3L	R-6896
R-6897	9	.1	350	12	19L	1.1	2.4	1.4	1.5	.2	R-6897
R-6898	6	.1	300	21	19	1.7	3.0	1.1	1.2	.2	R-6898
R-6899	2	.1	300	19	18L	1.0	1.3	2.8	.60	.1	R-6899
R-6900	10	.2	300	15	22L	1.2	4.0	3.0	1.9	.3	R-6900
R-6901	9	.1	600	16	28	2.2	3.8	4.9	1.6	.2	R-6901
R-6902	15	.2	610	61	59	2.4	5.9	3.2	2.5	.4	R-6902
R-6903	4	.1	450	17	20L	1.0	2.0	1.8	.80	.1	R-6903
R-6904	16	.2	310	340	27	.60	5.1	2.2	2.2	.3	R-6904
R-6905	9	.1	350	B	22L	1.0	3.2	1.4	1.4	.2	R-6905
R-6906	6	.1	250	18	19L	.90	1.6	.8	.90	.1	R-6906
R-6907	18	.2	400	220	21	1.3	7.1	2.7	2.4	.4	R-6907

Table 4a.--Content of 22 trace elements in 28 bituminous coal samples from Buchanan County, Virginia--continued

Sample number	Th (ppm)	U (ppm)	Yb (ppm)
R-6876	4.0	1.9	0.9
R-6877	3.0L	1.7	.9
R-6878	3.0	1.1	.9
R-6879	3.0L	1.5	1.0
R-6880	3.0L	1.0	.6
R-6881	3.0L	1.8	.8
R-6882	7.0	2.3	1.1
R-6883	3.0L	1.4	.8
R-6884	3.0L	.90	.8
R-6885	3.0L	.70	.6
R-6889	3.0L	2.2	.3
R-6890	5.0	1.6	.9
R-6891	3.0L	2.7	.6
R-6893	3.0L	1.8	.7
R-6894	3.0L	.90	.6
R-6895	3.0L	1.3	2.0
R-6896	3.0L	1.6	.3
R-6897	3.0L	3.3	.7
R-6898	3.0L	2.5	.7
R-6899	3.0L	1.1	.4
R-6900	4.0	2.5	1.2
R-6901	3.0L	3.6	.8
R-6902	3.0L	3.8	1.1
R-6903	3.0L	1.7	.5
R-6904	3.0L	2.3	1.0
R-6905	3.0L	3.3	.7
R-6906	3.0L	2.1	.5
R-6907	5.0	3.0	1.4

Table 4b.--Content of 22 trace elements in 17 bituminous coal samples from Dickenson County, 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)	Cl (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	Sample number
R-6853	82	5.0	B	2.7	5.5	0.3	0.10	28	0.3	0.14	R-6853
R-6854	6.0	6.0	B	12	5.6	.3	.18	20L	.2	.040	R-6854
R-6857	24	7.0	340	8.0	4.5	.2	.17	880	.2	.15	R-6857
R-6861	6.0	23	110	3.2	9.9	.7	.33	140	1.5	.030	R-6861
R-6862	4.0	32	100	4.5	29	3.9	.53	490	1.3	.020	R-6862
R-6865	4.0	18	B	10	7.4	.4	.28	36	1.1	.080	R-6865
R-6866	10	17	B	9.9	14	1.1	.56	76	.4	.18	R-6866
R-6867	7.0	11	B	3.3	3.3	.1	.25	20L	.6	.12	R-6867
R-6873	12	25	B	10	20	2.1	.43	96	1.1	.16	R-6873
R-6874	1.0	58	B	11	47	2.5	.90	170	2.8	.040	R-6874
R-6875	2.0	14	900	4.5	8.0	.5	.29	2,100	.7	.010L	R-6875
R-6920	6.0	11	B	6.1	8.6	.4	.27	48	.3	.13	R-6920
R-6922	15	60	B	10	53	3.8	.71	160	4.0	.10	R-6922
R-6941	7.0	26	B	14	19	2.6	.46	220	1.0	.070	R-6941
R-6943	11	15	B	9.1	11	.9	.27	20L	.6	.010	R-6943
R-6944	7.0	49	630	10	45	3.3	.61	170	3.5	.020	R-6944
R-7069	3.0	88	B	10	67	5.8	1.3	350	5.0	.010	R-7069

Table 4b.--Content of 22 trace elements in 17 bituminous coal samples from Dickenson County, Virginia--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
R-6853	3	0.1	140	22	11L	1.5	2.1	6.2	0.40	0.2	R-6853
R-6854	3	.1	220	12	13L	1.4	2.0	3.9	.70	.2	R-6854
R-6857	4	.1	600	10	20L	.30	1.1	2.6	.90	.1	R-6857
R-6861	12	.2	1,000	16	15	.60	2.9	4.4	2.3	.1L	R-6861
R-6862	18	.2	1,100	30	63	.70	6.9	6.7	2.9	.5	R-6862
R-6865	9	.2	210	33	16L	.50	2.6	4.3	1.6	.3	R-6865
R-6866	8	.2	220	20	16	1.8	4.5	1.4	2.5	.5	R-6866
R-6867	6	.1	49	35	11L	2.1	1.5	2.2	1.4	.3	R-6867
R-6873	13	.1	450	30	23	.60	4.0	1.7	2.1	.3	R-6873
R-6874	33	.4	780	190	44	.70	9.8	3.4	4.8	.7	R-6874
R-6875	8	.1	200	41	10	.30	1.9	2.5	1.5	.3	R-6875
R-6920	6	.1	300	25	23L	.70	2.2	1.3	1.3	.2	R-6920
R-6922	38	.4	610	250	75	1.1	10	4.3	4.3	.6	R-6922
R-6941	14	.2	410	30	39	1.6	4.3	2.2L	2.2	.3	R-6941
R-6943	8	.1	200	26	20L	.40	2.7	1.4	1.4	.2	R-6943
R-6944	30	.3	390	270	100L	.90	8.5	3.7	3.4	.5	R-6944
R-7069	47	.6	1,200	200	77	1.0	14	3.5	6.9	1	R-7069

Table 4b.--Content of 22 trace elements in 17 bituminous coal samples from Dickenson County, Virginia--continued

Sample number	Th (ppm)	U (ppm)	Yb (ppm)
R-6853	3.0L	0.50	0.4
R-6854	3.0L	.50	.5
R-6857	3.0	.30	.4
R-6861	4.0	3.2	1.0
R-6862	4.0	2.3	1.3
R-6865	4.0	4.7	.8
R-6866	3.0L	2.5	1.4
R-6867	3.0L	2.0	.6
R-6873	4.0	1.9	.9
R-6874	9.0	3.6	2.1
R-6875	3.0L	1.0	.7
R-6920	3.0L	1.2	.7
R-6922	12	3.8	2.3
R-6941	3.0L	1.2	1.2
R-6943	3.0L	1.9	.6
R-6944	13	2.8	2.0
R-7069	14	5.6	3.6

Table 4c.--Content of 22 trace elements in 1 bituminous coal sample from Lee County, 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
R-6923	2.0	9.0	7.3	8.7	0.8	0.19	76	0.2	0.16	5	R-6923

Table 4c.--Content of 22 trace elements in 1 bituminous coal sample from Lee County, Virginia--continued

Sample number	Lu (ppm)	Na (ppm)	P (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Tb (ppm)	U (ppm)	Sample number
R-6923	0.1	200	16	11	0.50	1.7	4.2	1.0	0.2	1.2	R-6923

Table 4c.--Content of 22 trace elements in 1 bituminous coal sample from Lee County, Virginia--continued

Sample number	Yb (ppm)
R-6923	0.5

Table 4d.--Content of 22 trace elements in 17 bituminous coal samples from Russell County, 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
R-6852	9.0	12	3.1	11	2.0	0.22	82	0.5	0.020	6	R-6852
R-6856	18	22	7.8	20	3.4	.37	190	.9	.10	11	R-6856
R-6863	3.0	16	4.2	10	.9	.27	66	.7	.030	8	R-6863
R-6864	3.0	34	5.1	31	2.5	.55	150	2.1	.040	18	R-6864
R-6869	3.0	22	7.6	14	.6	.32	54	1.1	.060	13	R-6869
R-6870	3.0	28	6.4	22	1.3	.39	66	1.5	.020	16	R-6870
R-6886	16	24	5.3	22	2.4	.38	110	1.2	.80	13	R-6886
R-6887	4.0	15	3.9	11	.2	.29	29	.8	.040	9	R-6887
R-6888	5.0	14	10	11	.4	.29	39	.6	.020	8	R-6888
R-6917	33	33	14	22	2.0	.59	130	1.6	.33	18	R-6917
R-6918	4.0	70	3.5	56	3.4	.90	260	3.3	.14	41	R-6918
R-6919	4.0	16	3.4	12	.4	.24	48	.7	.10	9	R-6919
R-6945	2.0	13	7.7	10	1.1	.22	860	.5	.010L	7	R-6945
R-6946	7.0	8.0	5.1	6.0	.4	.17	200	.4	.010L	4	R-6946
R-6947	17	6.0	5.0	5.5	.4	.17	68	.3	.010L	3	R-6947
R-6948	2.0	11	7.4	6.2	.5	.20	60	.6	.010L	6	R-6948
R-7161	3.0	9.0	1.7	4.5	.7L	.14	64	.3	.020	6	R-7161

Table 4d.--Content of 22 trace elements in 17 bituminous coal samples from Russell County, 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
R-6852	0.1	150	37	24	0.40	2.2	2.3	1.0	0.2	3.0L	R-6852
R-6856	.1	280	68	48	1.0	4.1	3.1	1.6	.3	5.0	R-6856
R-6863	.1	1,000	20	23L	.20	2.4	2.9	1.4	.2	5.0	R-6863
R-6864	.2	870	140	48	.40	6.9	2.7	2.3	.5	10	R-6864
R-6869	.1	930	48	24L	.40	3.0	2.8	1.5	.2	6.0	R-6869
R-6870	.2	230	92	19	.60	4.5	2.7	1.9	.3	6.0	R-6870
R-6886	.2	270	66	32	.50	4.2	3.7	2.1	.2	4.0	R-6886
R-6887	.1	430	24	17L	.20	2.4	2.4	1.3	.2	3.0L	R-6887
R-6888	.1	270	36	17L	1.1	3.2	2.3	1.4	.2	5.0	R-6888
R-6917	.2	300	29	29	1.1	4.8	3.0	3.2	.4	4.0	R-6917
R-6918	.4	710	36	76	.60	11	4.9	5.3	.7	12	R-6918
R-6919	.1	200	140	22L	.40	2.7	1.4	1.3	.2	3.0L	R-6919
R-6945	.1	600	15	16	.90	3.4	4.3	1.1	.2	3.0L	R-6945
R-6946	.1	400	11	19L	1.2	1.4	2.3	.80	.2	3.0L	R-6946
R-6947	.1	200	13	19L	1.8	1.4	2.1	.70	.2	3.0L	R-6947
R-6948	.1	300	14	20L	.40	1.5	3.1	1.0	.2	3.0L	R-6948
R-7161	.1L	100	23	32L	1.0L	1.2	2.9	.70	.1	3.0L	R-7161

Table 4d.--Content of 22 trace elements in 17 bituminous coal samples from Russell County, Virginia--continued

Sample number	U (ppm)	Yb (ppm)
R-6852	1.3	0.6
R-6856	1.5	.8
R-6863	.70	.7
R-6864	2.0	1.2
R-6869	1.3	.7
R-6870	2.0	.9
R-6886	.90	.9
R-6887	1.2	.7
R-6888	1.2	.8
R-6917	2.5	1.4
R-6918	4.3	2.2
R-6919	1.5	.6
R-6945	1.5	.7
R-6946	1.0	.6
R-6947	1.0	.5
R-6948	1.3	.6
R-7161	.20	.2

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Table 4e.--Content of 22 trace elements in 71 bituminous coal samples from Wise County, 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)	Cl (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Eu (ppm)	F (ppm)	Hf (ppm)	Hg (ppm)	Sample number
R-6814	1.3	24	B	8.7	22	1.6	0.40	20L	1.0	0.020	R-6814
R-6815	68	6.0	B	7.8	5.5	.3	.17	46	.3	.050	R-6815
R-6816	3.7	25	B	11	17	.5	.57	92	.8	.060	R-6816
R-6817	98	4.0	B	1.9	4.2	.3	.10	42	.2	.16	R-6817
R-6818	97	8.0	B	3.1	7.8	.4	.17	170	.3	.24	R-6818
R-6819	35	6.0	B	2.3	5.0	.2	.13	160	.2	.15	R-6819
R-6820	1.9	14	B	3.2	11	.4	.23	47	.6	.020	R-6820
R-6821	1.6	9.0	B	9.5	5.7	.1	.25	140	.3	.020	R-6821
R-6822	21	17	B	6.5	14	1.0	.39	140	.6	.073	R-6822
R-6823	2.6	16	B	21	12	.4	.46	110	.4	.030	R-6823
R-6824	6.3	4.0	B	5.4	4.2	.3	.12	150	.1	.030	R-6824
R-6825	17	4.0	B	12	4.2	.1	.12	22	.2	.050	R-6825
R-6826	2.0	15	B	6.0	6.7	.3	.27	28	.4	.010L	R-6826
R-6827	85	21	360	5.9	16	2.1	.41	32	.7	.10	R-6827
R-6828	3.6	11	B	1.6	4.9	.2	.15	46	.6	.29	R-6828
R-6829	15	9.0	250	1.8	7.8	.7	.20	20	.3	.10	R-6829
R-6830	43	19	B	5.3	15	.9	.36	100	.7	.26	R-6830
R-6831	42	14	B	4.3	13	.3	.26	78	.9	.27	R-6831
R-6832	7.0	5.0	B	4.1	4.7	.3	.09	46	.1	.050	R-6832
R-6833	140	6.0	B	4.1	6.8	.4	.15	54	.3	.23	R-6833
R-6834	3.0	8.0	B	1.7	4.0	.1	.15	42	.3	.070	R-6834
R-6835	1.0	24	B	6.5	18	.5	.30	140	1.1	.040	R-6835
R-6836	12	17	B	4.5	6.5	.2	.34	60	.4	.21	R-6836
R-6837	4.0	19	B	11	17	.4	.34	130	.9	.080	R-6837
R-6838	20	7.0	B	2.2	6.6	.5	.15	37	.3	.15	R-6838
R-6839	1.0	8.0	B	13	6.1	.2	.19	22	.4	.010	R-6839
R-6840	2.0	10	B	7.1	16	.5L	.28	20L	.4	.020	R-6840
R-6841	3.0	22	B	7.8	19	.5	.41	75	1.0	.11	R-6841
R-6842	18	4.0	B	2.9	3.0	.0	.15	20L	.6	.090	R-6842
R-6844	2.0	21	400	8.8	12	4.0	.40	54	.4	.010	R-6844
R-6845	45	11	B	4.0	8.7	.4	.29	70	.3	.22	R-6845
R-6846	14	23	210	6.1	13	.8	.52	610	.5	.11	R-6846
R-6847	7.0	17	B	3.5	13	.8	.23	58	.7	.12	R-6847
R-6848	78	27	B	11	24	1.7	.45	120	.8	.33	R-6848
R-6849	16	15	B	4.3	11	.2	.25	63	.7	.10	R-6849
R-6850	15	8.0	B	4.2	7.4	.2	.15	80	.4	.18	R-6850
R-6851	34	37	650	6.7	20	1.3	.73	320	.8	.18	R-6851
R-6855	37	12	B	13	11	.3	.30	63	.3	.24	R-6855
R-6858	1.0	15	B	3.9	7.3	.4	.35	38	.7	.11	R-6858
R-6859	7.0	60	220	15	42	3.1	.99	360	2.0	.020	R-6859

Table 4e.--Content of 22 trace elements in 71 bituminous coal samples from Wise County, Virginia--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
R-6814	14	0.1	400	540	22	0.34	4.3	1.5	2.2	0.3	R-6814
R-6815	3	.1	190	260	13L	.87	1.5	2.4	.70	.1	R-6815
R-6816	14	.2	150	450	14L	.37	3.6	1.7	2.9	.5	R-6816
R-6817	2	.1	240	30	10L	.82	1.3	4.4	.50	.2	R-6817
R-6818	4	.1	230	15	8	.91	2.1	7.6	.80	.1	R-6818
R-6819	3	.1	190	25	11L	.37	1.5	7.0	.60	.1	R-6819
R-6820	8	.1	260	59	15L	.37	2.1	1.3	1.3	.2	R-6820
R-6821	5	.1	290	11	11L	.50	1.7	3.3	1.1	.2	R-6821
R-6822	9	.2	780	690	15	2.5	3.4	1.8	1.6	.3	R-6822
R-6823	7	.3	380	220	15L	.78	3.0	1.5	2.1	.4	R-6823
R-6824	2	.1	400	83	11L	.70	1.8	2.1	.50	.1	R-6824
R-6825	2	.1	290	8	11L	.77	1.3	1.7	.60	.1	R-6825
R-6826	7	.1	250	4	13L	.23	1.9	2.7	1.7	.3	R-6826
R-6827	11	.2	200	48	28	1.2	3.9	4.9	2.0	.4	R-6827
R-6828	5	.1	330	19	12L	.31	1.4	2.2	1.0	.2	R-6828
R-6829	5	.1	200	25	30	.40	2.4	4.6	1.0	.2	R-6829
R-6830	10	.2	250	360	19	1.1	4.1	2.7	1.7	.4	R-6830
R-6831	8	.1	220	190	14L	.55	2.7	3.2	1.2	.2	R-6831
R-6832	2	.1	450	3	12L	.62	1.3	2.5	.50	.1	R-6832
R-6833	4	.1	410	73	14L	.96	1.9	6.0	.60	.1	R-6833
R-6834	5	.1	180	47	10L	.15	.90	2.5	.70	.1	R-6834
R-6835	14	.2	400	620	24L	.40	3.5	1.5	1.9	.3	R-6835
R-6836	8	.1	120	8	15L	.50	2.1	3.6	1.9	.4	R-6836
R-6837	10	.2	220	540	19L	.90	3.8	1.2	1.7	.3	R-6837
R-6838	4	.1	520	22	15L	.19	1.4	6.8	.70	.5L	R-6838
R-6839	4	.1	110	28	10	.60	2.3	1.3	.80	.1	R-6839
R-6840	3	.1	510	21	22L	.30	1.9	3.1	.60	.6L	R-6840
R-6841	12	.2	210	120	19L	.70	4.3	2.9	2.1	.3	R-6841
R-6842	2	.1	380	24	24L	.80	1.5	2.1	.50	.6L	R-6842
R-6844	12	.2	400	430	20L	.70	3.5	1.3	1.9	.3	R-6844
R-6845	6	.1	770	59	18L	.30	2.0	2.0	1.2	.5L	R-6845
R-6846	12	.2	400	51	15	.30	3.1	3.3	2.7	.4	R-6846
R-6847	9	.1	360	160	27L	.40	2.9	2.5	1.5	.8L	R-6847
R-6848	17	.2	400	41	30	1.4	5.6	2.7	2.5	.7L	R-6848
R-6849	8	.1	320	400	28L	.40	2.8	1.1	1.2	.8L	R-6849
R-6850	4	.1	110	260	11L	.80	1.8	3.4	.60	.3L	R-6850
R-6851	22	.2	200	47	21	1.0	4.2	2.4	3.5	.6	R-6851
R-6855	7	.2	170	130	16L	1.6	2.9	2.8	1.4	.2	R-6855
R-6858	7	.1	260	11	7	.20	1.7	1.6	1.6	.3	R-6858
R-6859	33	.4	700	110	76	.80	9.5	3.1	5.4	.8	R-6859

Table 4e.--Content of 22 trace elements in 71 bituminous coal samples from Wise County, Virginia--continued

Sample number	Th (ppm)	U (ppm)	Yb (ppm)
R-6814	5.0	1.2	0.9
R-6815	3.0L	.80	.5
R-6816	6.0	.90	1.5
R-6817	3.0L	1.1	.3
R-6818	3.0L	.70	.5
R-6819	3.0L	.70	.4
R-6820	3.0L	1.3	.6
R-6821	3.0	.30	.7
R-6822	3.0L	2.2	.9
R-6823	3.0	.70	1.4
R-6824	3.0L	.50	.3
R-6825	3.0L	.50	.4
R-6826	3.0L	1.3	.8
R-6827	3.0	1.2	1.1
R-6828	3.0L	1.4	.5
R-6829	3.0L	1.7	.6
R-6830	3.0	1.5	1.1
R-6831	4.0	1.6	.7
R-6832	3.0L	.40	.4
R-6833	3.0L	.60	.4
R-6834	3.0L	.40	.3
R-6835	3.0L	1.6	.7
R-6836	3.0L	.80	.8
R-6837	3.0L	2.5	1.0
R-6838	3.0L	1.3	.3
R-6839	3.0L	.90	.5
R-6840	3.0L	.40	.5
R-6841	4.0	3.3	1.0
R-6842	3.0L	.70	.4
R-6844	3.0L	.80	1.1
R-6845	3.0L	.80	.5
R-6846	3.0L	1.9	1.2
R-6847	3.0L	1.5	.5
R-6848	7.0	2.6	1.2
R-6849	3.0L	1.2	.7
R-6850	3.0L	.80	.3
R-6851	3.0L	2.3	1.5
R-6855	3.0L	2.6	.9
R-6858	3.0L	.90	.7
R-6859	9.0	2.8	2.2

Table 4e.--Content of 22 trace elements in 71 bituminous coal samples from Wise County, Virginia--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
R-6860	3.0	14	B	5.8	9.9	0.4	0.20	62	0.6	0.070	R-6860
R-6868	8.0	12	850	2.5	11	1.7	.23	820	.6	.010L	R-6868
R-6871	10	30	B	14	16	.5	.37	70	.9	.11	R-6871
R-6872	13	25	B	4.4	18	.5	.35	64	1.2	.060	R-6872
R-6908	4.0	22	B	7.2	15	.9	.39	76	.7	.28	R-6908
R-6909	8.0	26	B	15	21	.6	.53	160	1.0	.26	R-6909
R-6910	1.0	6.0	B	6.6	3.7	.8L	.12	20L	.3	.10	R-6910
R-6911	78	5.0	B	2.2	5.7	.3	.10	68	.4	.20	R-6911
R-6912	2.0	13	B	16	9.3	.3	.22	200	.5	.10	R-6912
R-6913	2.0	14	B	14	9.8	.5	.35	59	.4	.090	R-6913
R-6914	3.0	23	B	5.4	23	1.5	.38	150	.8	.090	R-6914
R-6915	2.0	13	B	1.9	7.8	.9	.17	96	.4	.16	R-6915
R-6916	2.0	18	B	2.3	9.7	1.2	.37	220	.8	.060	R-6916
R-6934	2.0	7.0	B	2.6	3.7	.3	.17	20L	.3L	.010L	R-6934
R-6935	2.0	8.0	B	6.6	4.4	.3	.15	20L	.4	.010L	R-6935
R-6936	1.0	36	B	13	35	2.0	.65	300	1.5	.030	R-6936
R-6937	1.0	18	B	11	10	.6	.38	72	.7	.090	R-6937
R-6938	16	12	B	2.2	12	.8	.23	68	.5	.24	R-6938
R-6939	15	10	B	12	8.8	.3	.20	60	.4	.24	R-6939
R-6940	4.0	31	B	6.1	21	2.7	.51	92	1.1	.12	R-6940
R-7068	47	10	110	4.6	9.0	.2	.19	120	.5	.21	R-7068
R-7070	29	9.0	B	1.2	8.1	.3	.16	28	.4	.29	R-7070
R-7071	3.0	13	B	7.7	7.4	.1	.26	29	.6	.020	R-7071
R-7072	17	23	B	12	17	1.2	.52	20L	.7	.040	R-7072
R-7073	10	24	B	9.6	22	1.0	.52	1,900	.6	.040	R-7073
R-7160	13	2.0	B	6.6	5.0L	.1	.08	68	.4L	.060	R-7160
R-7168	7.0	9.0	B	8.6	6.4	.4	.24	140	.4	.17	R-7168
R-7169	12	11	B	11	11	.6	.31	130	.4	.010	R-7169
R-7171	3.0	7.0	160	12	6.2	.4	.12	27	.3	.010L	R-7171
R-7174	10	16	130	4.5	9.8	.3	.31	23	.7	.020	R-7174
R-7175	4.0	12	390	9.9	7.5	.3	.21	60	.5	.010L	R-7175

Table 4e.--Content of 22 trace elements in 71 bituminous coal samples from Wise County, Virginia--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
R-6860	8	0.1	190	110	14L	0.30	2.8	1.7	1.1	0.2	R-6860
R-6868	7	.1	400	57	24	.40	2.6	1.9	1.1	.2	R-6868
R-6871	16	.2	210	56	13	.60	2.8	4.0	2.6	.4	R-6871
R-6872	15	.2	370	220	7	.90	4.1	2.9	1.9	.3	R-6872
R-6908	12	.1	300	810	45L	.70	3.4	4.0	2.0	.3	R-6908
R-6909	14	.1	200	20	27L	.90	4.1	7.6	2.3	.4	R-6909
R-6910	4	.1	300	5	32L	.20	.90	1.6	.60	.1	R-6910
R-6911	3	.1	200	24	21L	.60	1.9	6.4	.50	.5L	R-6911
R-6912	8	.1	300	780	33L	1.1L	1.9	1.2	1.1	.5L	R-6912
R-6913	7	.1	200	10	27L	1.6	2.7	2.0	1.7	.3	R-6913
R-6914	14	.2	290	62	49	.60	4.2	2.9	2.2	.3	R-6914
R-6915	8	.1	300	35	18	.40	2.0	.9	1.2	.2	R-6915
R-6916	10	.1	400	24	12	.30	2.6	7.2	1.7	.3	R-6916
R-6934	3	.1	200	B	13L	.30	1.5	1.3	.80	.3L	R-6934
R-6935	5	.1	400	9	15L	.30	1.7	4.4	.80	.1	R-6935
R-6936	20	.2	690	67	43	.90	7.4	4.6	3.3	.5	R-6936
R-6937	10	.1	500	21	29L	1.4L	2.3	4.3	1.7	.3	R-6937
R-6938	6	.1	300	28	28L	.80	1.9	2.3	1.0	.2	R-6938
R-6939	5	.1	300	170	40L	.40	2.5	1.0	.90	.2	R-6939
R-6940	17	.2	700	46	57L	.70	5.3	2.7	2.7	.4	R-6940
R-7068	5	.1	100	150	50L	.80	1.7	3.2	1.0	.6L	R-7068
R-7070	5	.1	100	50	18L	.30	2.0	2.6	.70	.1	R-7070
R-7071	7	.1	200	76	15L	2.0	2.6	4.2	1.2	.2	R-7071
R-7072	11	.2	200	37	19	1.0	4.4	2.0	2.5	.5	R-7072
R-7073	11	.2	200	65	24L	.80	5.5	2.4	2.5	.4	R-7073
R-7160	1	.1	200	17	24L	.60	1.1	2.8	.30	.3L	R-7160
R-7168	5	.1	400	47	33L	.40	2.3	2.4	1.0	.2	R-7168
R-7169	7	.2	200	32	32L	.70	3.5	1.5	1.4	.2	R-7169
R-7171	4	.1	700	1	60L	.90	1.3	1.4	.70	.2L	R-7171
R-7174	9	.1	200	4	40L	.50	2.5	3.1	1.4	.3	R-7174
R-7175	6	.1	200	21	40L	.60	1.9	.9	1.1	.2	R-7175

Table 4e.--Content of 22 trace elements in 71 bituminous coal samples from Wise County, Virginia--continued

Sample number	Th (ppm)	U (ppm)	Yb (ppm)
R-6860	3.0L	1.2	0.6
R-6868	3.0	1.0	.6
R-6871	3.0L	2.2	1.0
R-6872	5.0	1.8	.9
R-6908	3.0L	1.9	.9
R-6909	3.0L	2.4	.9
R-6910	3.0L	.90	.3
R-6911	3.0L	.80	.4
R-6912	3.0L	1.2	.5
R-6913	3.0L	1.4	.9
R-6914	3.0L	2.1	.8
R-6915	3.0L	3.3	.6
R-6916	3.0L	1.6	.7
R-6934	3.0L	1.0	.5
R-6935	3.0L	1.4	.5
R-6936	6.0	2.9	1.6
R-6937	3.0L	1.2	.8
R-6938	3.0L	1.9	.5
R-6939	3.0L	1.0	.7
R-6940	3.0	1.7	1.3
R-7068	3.0	.70	.4
R-7070	3.0L	1.4	.4
R-7071	3.0L	1.6	.7
R-7072	3.0L	1.6	1.4
R-7073	3.0L	1.8	1.2
R-7160	3.0L	.20	.3
R-7168	3.0L	.20	.5
R-7169	3.0L	.60	1.1
R-7171	3.0L	.40L	.4
R-7174	4.0L	1.1	.8
R-7175	4.0L	.70	.5

VIRGINIA DIVISION OF MINERAL RESOURCES

Table 5a.--Major, minor, and trace element composition of 28 bituminous coal samples from Buchanan County, 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
R-6876	0.92	0.58	0.033	0.036	0.030	0.13	0.77	0.021	0.01	22	R-6876
R-6877	2.5	1.1	.076	.047	.032	.22	2.3	.046	.05	37	R-6877
R-6878	3.7	1.0	.044	.027	.084	.18	.30	.17	.02	2.0	R-6878
R-6879	4.3	2.8	.15	.17	.032	.67	2.5	.11	.02	22	R-6879
R-6880	.35	.22	.027	.014	.032	.035	.27	.008	.02	6.0	R-6880
R-6881	.35	.27	.037	.011	.030	.032	1.9	.008	.03	88	R-6881
R-6882	3.3	2.5	.48	.062	.093	.23	.75	.13	.03	13	R-6882
R-6883	1.5	.81	1.7	.12	.073	.071	.43	.062	.02	15	R-6883
R-6884	.83	.51	.57	.045	.032	.037	.48	.041	.03	6.0	R-6884
R-6885	.49	.37	.093	.032	.005	.048	.32	.019	.01	2.0	R-6885
R-6889	.42	.16	.092	.014	.020	.029	.32	.007	.02	7.0	R-6889
R-6890	2.7	1.4	.067	.071	.056	.24	.37	.10	.03	2.0	R-6890
R-6891	2.0	1.3	.17	.060	.043	.30	.92	.050	.03	120	R-6891
R-6893	5.7	3.0	.14	.26	.040	.84	2.5	.19	.05	35	R-6893
R-6894	1.5	.98	.058	.012	.010	.093	.19	.067	.03	8.0	R-6894
R-6895	1.1	.83	.059	.022	.023	.17	2.1	.039	.06	110	R-6895
R-6896	B	B	B	.010	.030	B	B	B	.01	8.0	R-6896
R-6897	1.6	1.1	.053	.019	.035	.042	.21	.068	.03	1.0	R-6897
R-6898	1.5	.89	.030	.056	.030	.24	.59	.037	.02	12	R-6898
R-6899	.54	.31	.033	.012	.030	.056	.32	.019	.01	16	R-6899
R-6900	3.1	1.6	.058	.039	.030	.20	.67	.17	.03	55	R-6900
R-6901	2.6	1.9	.056	.086	.060	.51	.86	.067	.02	38	R-6901
R-6902	5.9	3.1	.095	.26	.061	.94	1.4	.14	.02L	170	R-6902
R-6903	1.1	.63	.039	.044	.045	.16	.80	.025	.01	14	R-6903
R-6904	4.3	2.4	.11	.066	.031	.30	.51	.17	.05	15	R-6904
R-6905	B	B	B	.020	.035	B	B	B	.03	1.0	R-6905
R-6906	1.3	.69	.041	.018	.025	.043	.36	.047	.02	14	R-6906
R-6907	5.9	3.1	.087	.092	.040	.40	.43	.28	.04	2.0	R-6907

Table 5a.--Major, minor, and trace element composition of 28 bituminous coal samples from Buchanan County, Virginia 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
R-6876	7.7	36	3.8	0.19	8.0	760	9.4	6.3	0.7	18	R-6876
R-6877	H	280	5.9	.10	27	B	16	12	1.3	21	R-6877
R-6878	20	68	2.0	.02	17	B	2.9	13	.6	11	R-6878
R-6879	23	130	11	.47	10	B	11	7.8	1.1	70	R-6879
R-6880	4.4	18	2.3	.05	5.0	B	5.6	3.2	.4	9.7	R-6880
R-6881	H	21	1.3	.10	7.0	B	5.4	4.0	.2	16	R-6881
R-6882	15	150	2.4	.10	24	B	3.8	21	.9	24	R-6882
R-6883	11	110	.9	.08	17	B	6.2	10	.3	15	R-6883
R-6884	4.3	52	1.7	.04	15	B	8.9	9.0	.5	17	R-6884
R-6885	1.7	23	1.5	.00	11	B	4.5	4.9	.3	9.9	R-6885
R-6889	3.2	23	1.6	.03	4.0	B	5.7	2.8	.2	7.6	R-6889
R-6890	13	77	1.4	.03	22	B	4.7	14	1.5	20	R-6890
R-6891	8.7	64	2.5	.04	15	B	4.1	11	1.8	17	R-6891
R-6893	28	210	8.0	.13	15	B	6.9	12	1.6	31	R-6893
R-6894	3.9	32	.9	.01	15	B	3.2	9.5	.4	8.1	R-6894
R-6895	H	42	3.1	.15	17	B	16	9.8	1.0	44	R-6895
R-6896	4.4	19	1.8	.04	3.0	B	3.0	3.2	.2	9.5	R-6896
R-6897	5.0	44	1.7	.04	16	B	6.9	16	.4	13	R-6897
R-6898	8.4	47	2.3	.09	11	B	5.7	8.8	1.6	17	R-6898
R-6899	7.3	26	1.9	.13	5.0	B	6.9	3.5	.4	17	R-6899
R-6900	8.5	97	7.4	.04	18	B	7.6	18	1.4	28	R-6900
R-6901	16	81	1.7	.07	17	B	3.9	16	2.9	20	R-6901
R-6902	26	140	3.5	.09	27	B	8.6	25	4.1	26	R-6902
R-6903	11	110	1.0	.06	8.0	B	4.1	6.4	.9	14	R-6903
R-6904	10	110	2.6	.06	27	B	9.5	23	2.1	21	R-6904
R-6905	5.2	57	1.8	.02	16	B	9.0	15	.4	14	R-6905
R-6906	5.0	41	1.9	.03	9.0	B	2.1	5.9	.2	9.9	R-6906
R-6907	16	120	4.0	.05	30	B	13	33	2.1	21	R-6907

Table 5a.---Major, minor, and trace element composition of 28 bituminous coal samples from Buchanan County, Virginia 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)	La (ppm)	Sample number
R-6876	1.4	0.7	0.20	56	4.8	1.0	3.8	0.2	0.030	4	R-6876
R-6877	3.9L	1.2L	.40	63	5.0	2.8	8.5	.7	.060	17	R-6877
R-6878	3.6L	1.1L	.22	55	4.1	1.0	4.1	1.3	.040	12	R-6878
R-6879	6.8L	2.1L	.24	58	16	1.5	13	.4	.050	5	R-6879
R-6880	.7	.4	.21	21	2.1	.70	3.2	.3	.010L	2	R-6880
R-6881	1.5L	.5L	.25	31	2.8	1.4	.42	.2	.13	3	R-6881
R-6882	5.4L	2.0	.43	58	4.6	1.2L	.85L	1.3	.080	13	R-6882
R-6883	3.8L	1.2L	.30	29	.7	1.3	.59L	.7	.11	10	R-6883
R-6884	1.8L	.8	.26	23	1.9	1.5	.86	.6	.060	8	R-6884
R-6885	.9L	.3L	.20	24	1.5	.41	4.6	.3	.010	5	R-6885
R-6889	.7L	.2L	.11	30	1.3	.71	2.1	.1	.040	2	R-6889
R-6890	3.4L	1.1L	.36	74	4.4	.74L	.53L	.9	.020	12	R-6890
R-6891	3.2L	1.0L	.26	85	3.8	.71L	.51L	.4	.37	7	R-6891
R-6893	8.3L	2.6L	.28	94	12	2.1	2.6	.6	.17	8	R-6893
R-6894	2.0L	.6L	.25	39	2.5	.43	.43	.6	.13	8	R-6894
R-6895	2.7L	1.2	.56	44	3.4	1.5	.75	.4	.25	8	R-6895
R-6896	.7L	.4	.09	20L	1.7	.46	2.1	.3L	.040	2	R-6896
R-6897	2.1L	.7	.27	34	2.9	.67	3.5	.7	.030	9	R-6897
R-6898	2.2L	.7L	.24	66	4.4	.63	.70	.3	.070	6	R-6898
R-6899	.9L	.3L	.14	20	2.5	.62	.84	.2	.060	2	R-6899
R-6900	3.7L	1.2L	.39	64	6.7	1.3	2.6	1.4	.16	10	R-6900
R-6901	3.9L	1.2L	.30	120	6.8	.86L	1.4	.6	.070	9	R-6901
R-6902	7.5L	2.3L	.47	200	10	1.6L	1.2L	1.1	.13	15	R-6902
R-6903	1.8L	.6L	.19	44	3.0	.57	.29	.2	.10	4	R-6903
R-6904	5.3L	1.7	.41	130	5.4	1.2L	1.3	1.2	.11	16	R-6904
R-6905	2.3L	1.0	.28	39	3.6	.51L	3.9	.7	.040	9	R-6905
R-6906	1.7L	.6	.15	30	3.4	.62	.73	.4	.020	6	R-6906
R-6907	6.7L	2.1L	.49	130	11	1.5L	12	1.8	.010L	18	R-6907

Table 5a.--Major, minor, and trace element composition of 28 bituminous coal samples from Buchanan County, 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
R-6876	6.2	0.1	11	4.0	0.72	4.8	16	21	2.8	7.2L	R-6876
R-6877	8.1	.2	18	2.1	1.5	13	25	85	2.7	9.4	R-6877
R-6878	5.4	.2	4.9	.89	5.0	7.7	4.7	44	4.4	7.5L	R-6878
R-6879	21	.2	51	5.3	.85	10	32	56	23	14L	R-6879
R-6880	1.2	.1	3.6	1.3	.23	2.5	5.1	11	1.5	1.3L	R-6880
R-6881	1.0	.1	8.9	2.4	.52	2.8	8.9	16	.85	3.2L	R-6881
R-6882	29	.2	22	2.7	4.1	7.8L	8.3	140	9.1	11L	R-6882
R-6883	11	.1	46	1.9	1.2	5.4L	5.8	77	1.2	8.0L	R-6883
R-6884	7.4	.1	19	1.9	1.1	2.6L	6.3	30	1.7	3.9L	R-6884
R-6885	6.1	.1	10	.55	.29	2.2	3.5	10	2.3	2.0L	R-6885
R-6889	1.2	.1	30	3.0	.37	2.3	6.2	24	1.3	1.6L	R-6889
R-6890	20	.2	16	1.1	1.8	6.0	8.5	780	7.9	7.1L	R-6890
R-6891	14	.1	14	1.5	.81	5.4	4.8	49	3.0	6.9L	R-6891
R-6893	19	.1	57	3.4	2.6	22	26	34	9.8	18L	R-6893
R-6894	16	.1	11	.99	1.1	5.5	6.8	51	4.7	4.2L	R-6894
R-6895	9.1	.3	17	2.8	.91	6.1	12	29	5.8	5.6L	R-6895
R-6896	1.6	.1	2.9	2.3	.17	2.5	5.7	B	1.6	1.4L	R-6896
R-6897	17	.1	6.0	.54	1.3	6.4	15	12	5.1	4.6L	R-6897
R-6898	7.0	.1	12	2.9	.42	6.9	9.8	21	4.7	4.8L	R-6898
R-6899	2.2	.1	5.1	1.2	.27	3.5	7.6	19	1.6	1.8L	R-6899
R-6900	21	.2	11	1.4	4.3	5.3L	10	15	7.3	7.9L	R-6900
R-6901	9.7	.1	9.0	2.5	.74	8.0	8.6	16	5.9	8.4L	R-6901
R-6902	21	.2	54	2.6	1.2	14	16	61	9.4	16L	R-6902
R-6903	9.1	.1	43	2.5	.34	3.9	6.8	17	3.0	3.9L	R-6903
R-6904	41	.2	9.7	1.3	2.6	15	16	340	12	11L	R-6904
R-6905	16	.1	5.2	.58	1.2	8.0	20	B	9.5	5.0L	R-6905
R-6906	8.8	.1	3.5	2.4	1.2	7.3	10	18	3.4	3.5L	R-6906
R-6907	110	.2	9.7	.63L	3.8	15	23	220	14	14L	R-6907

Table 5a. --Major, minor, and trace element composition of 28 bituminous coal samples from Buchanan County, 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
R-6876	11	2.3	2.5	1.7	0.90	0.10L	82	0.2	4.0	0.14L	R-6876
R-6877	14	2.3	3.0	2.3	2.1	.85L	93	.3	3.0L	1.2L	R-6877
R-6878	11	.90	2.4	1.7	1.6	.78L	56	.2	3.0	1.1L	R-6878
R-6879	12	2.6	3.1	1.6	1.0	1.5L	130	.3	3.0L	2.1L	R-6879
R-6880	7L	2.7	2.1	2.0	.90	.13L	30	.2	3.0L	.19L	R-6880
R-6881	9L	.90	2.1	3.7	1.1	.33L	36	.2	3.0L	.47L	R-6881
R-6882	10	1.1	4.6	4.5	2.4	1.2L	100	.4	7.0	1.7L	R-6882
R-6883	9L	1.1	2.2	3.9	1.7	.83L	99	.2	3.0L	1.2L	R-6883
R-6884	9L	1.1	2.0	1.2	1.5	.57	52	.3	3.0L	.57L	R-6884
R-6885	7L	1.5	1.3	1.1	1.3	.32	25	.2	3.0L	.29L	R-6885
R-6889	14L	1.5	1.1	2.2	.40	.21	37	.1	3.0L	.23L	R-6889
R-6890	19	.60	3.4	3.1	1.8	1.4	83	.3	5.0	1.1L	R-6890
R-6891	19	1.5	2.6	4.2	1.3	.71L	60	.2	3.0L	1.7	R-6891
R-6893	22	.90	3.0	6.1	1.3	1.8L	170	.2	3.0L	2.6L	R-6893
R-6894	11L	.50	2.2	2.3	1.3	.81	44	.2	3.0L	.62L	R-6894
R-6895	17L	2.2	3.2	2.2	2.3	.58L	44	.5	3.0L	3.1	R-6895
R-6896	16L	1.5	.80	1.3	.40	.15L	34	.3L	3.0L	.48	R-6896
R-6897	19L	1.1	2.4	1.4	1.5	.47L	60	.2	3.0L	.67L	R-6897
R-6898	19	1.7	3.0	1.1	1.2	.49L	43	.2	3.0L	.70L	R-6898
R-6899	18L	1.0	1.3	2.8	.60	.35	38	.1	3.0L	.27L	R-6899
R-6900	22L	1.2	4.0	3.0	1.9	.81L	44	.3	4.0	3.4	R-6900
R-6901	28	2.2	3.8	4.9	1.6	.86L	70	.2	3.0L	1.2L	R-6901
R-6902	59	2.4	5.9	3.2	2.5	1.6L	56	.4	3.0L	2.3L	R-6902
R-6903	20L	1.0	2.0	1.8	.80	.40L	46	.1	3.0L	1.5	R-6903
R-6904	27	.60	5.1	2.2	2.2	1.3	130	.3	3.0L	1.7L	R-6904
R-6905	22L	1.0	3.2	1.4	1.4	.51L	71	.2	3.0L	.73L	R-6905
R-6906	19L	.90	1.6	.8	.90	.36L	50	.1	3.0L	.52L	R-6906
R-6907	21	1.3	7.1	2.7	2.4	1.5L	130	.4	5.0	2.1L	R-6907

Table 5a.--Major, minor, and trace element composition of 28 bituminous coal samples from Buchanan County, Virginia reported on whole-coal basis--continued

Sample number	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zn-S (ppm)	Sample number
R-6876	1.9	15	9.1	0.9	16	7.7	R-6876
R-6877	1.7	22	11	.9	18	19	R-6877
R-6878	1.1	16	3.4	.9	4.3	41	R-6878
R-6879	1.5	34	16	1.0	66	12	R-6879
R-6880	1.0	6.1	4.6	.6	16	1.6	R-6880
R-6881	1.8	7.5	5.6	.8	56	2.4	R-6881
R-6882	2.3	24	11	1.1	9.6	37	R-6882
R-6883	1.4	8.4	5.8	.8	3.2	18	R-6883
R-6884	.90	8.0	6.3	.8	3.2	13	R-6884
R-6885	.70	3.8	2.5	.6	2.3	2.2	R-6885
R-6889	2.2	7.1	4.6	.3	8.7	3.0	R-6889
R-6890	1.6	15	3.9	.9	12	9.5	R-6890
R-6891	2.7	14	3.7	.6	5.8	7.1	R-6891
R-6893	1.8	39	11	.7	36	26	R-6893
R-6894	.90	12	2.9	.6	5.1	5.8	R-6894
R-6895	1.3	10	10	2.0	38	4.6	R-6895
R-6896	1.6	7.1	3.8	.3	7.4	2.0	R-6896
R-6897	3.3	15	6.4	.7	4.8	12	R-6897
R-6898	2.5	18	6.9	.7	24	6.5	R-6898
R-6899	1.1	4.9	3.8	.4	3.5	3.0	R-6899
R-6900	2.5	20	6.8	1.2	4.5	59	R-6900
R-6901	3.6	27	4.6	.8	18	6.2	R-6901
R-6902	3.8	42	8.9	1.1	28	17	R-6902
R-6903	1.7	11	4.0	.5	17	4.4	R-6903
R-6904	2.3	35	9.2	1.0	8.7	20	R-6904
R-6905	3.3	18	6.5	.7	5.1	12	R-6905
R-6906	2.1	13	6.8	.5	3.7	14	R-6906
R-6907	3.0	53	11	1.4	12	27	R-6907

Table 5b.--Major, minor, and trace element composition of 17 bituminous coal samples from Dickenson County, 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 spectrography; 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
R-6853	0.53	0.38	0.051	0.016	0.014	0.056	1.2	0.027	0.02	82	R-6853
R-6854	.38	.36	.027	.008	.022	.022	.12	.017	.04	6.0	R-6854
R-6857	.43	.39	.073	.015	.060	.037	.65	.017	.02	24	R-6857
R-6861	2.7	2.0	.13	.093	.10	.18	.39	.066	.02	6.0	R-6861
R-6862	5.6	3.5	.23	.18	.11	.82	.64	.15	.02L	4.0	R-6862
R-6865	2.0	1.4	.083	.034	.021	.090	.45	.075	.04	4.0	R-6865
R-6866	1.7	1.2	.10	.042	.022	.25	.65	.045	.02	10	R-6866
R-6867	.57	.46	.077	.008	.005	.022	.20	.018	.02	7.0	R-6867
R-6873	3.4	1.8	.28	.11	.045	.31	.60	.11	.03	12	R-6873
R-6874	6.9	4.5	.61	.12	.078	.83	.57	.31	.03	1.0	R-6874
R-6875	2.0	.79	.73	.055	.020	.13	.46	.051	.01L	2.0	R-6875
R-6920	1.0	.67	.087	.042	.030	.10	.43	.034	.01	6.0	R-6920
R-6922	9.0	4.2	.12	.14	.061	.71	.64	.48	.03L	15	R-6922
R-6941	4.5	2.2	.063	.22	.041	.77	.79	.12	.03	7.0	R-6941
R-6943	1.7	1.0	.55	.086	.020	.11	.49	.062	.01L	11	R-6943
R-6944	8.0	3.7	.12	.13	.039	.67	.64	.40	.03	7.0	R-6944
R-7069	15	6.9	.78	.38	.12	1.5	1.0	.53	.10	3.0	R-7069

Table 5b.--Major, minor, and trace element composition of 17 bituminous coal samples from Dickenson County, Virginia 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
R-6853	6.8	23	1.6	0.04	5.0	B	2.7	5.5	0.3	8.6	R-6853
R-6854	6.4	15	3.6	.06	6.0	B	12	5.6	.3	12	R-6854
R-6857	10	20	.4	.06	7.0	340	8.0	4.5	.2	11	R-6857
R-6861	36	110	2.3	.03	23	110	3.2	9.9	.7	12	R-6861
R-6862	48	300	2.1	.08	32	100	4.5	29	3.9	22	R-6862
R-6865	9.1	53	2.8	.06	18	B	10	7.4	.4	21	R-6865
R-6866	12	61	2.3	.08	17	B	9.9	14	1.1	20	R-6866
R-6867	4.8	24	1.2	.02	11	B	3.3	3.3	.1	7.5	R-6867
R-6873	12	110	1.3	.08	25	B	10	20	2.1	18	R-6873
R-6874	28	180	2.5	.06	58	B	11	47	2.5	31	R-6874
R-6875	9.0	55	1.6	4.1	14	900	4.5	8.0	.5	13	R-6875
R-6920	2.9	35	.8	.04	11	B	6.1	8.6	.4	13	R-6920
R-6922	13	140	2.7	.05	60	B	10	53	3.8	31	R-6922
R-6941	19	100	5.5	.10	26	B	14	19	2.6	17	R-6941
R-6943	4.0	71	1.4	.02	15	B	9.1	11	.9	14	R-6943
R-6944	17	130	3.0	.05	49	630	10	45	3.3	28	R-6944
R-7069	43	310	4.1	.12	88	B	10	67	5.8	41	R-7069

Table 5b.--Major, minor, and trace element composition of 17 bituminous coal samples from Dickenson County, Virginia 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
R-6853	1.4L	0.5L	0.10	28	2.3	0.32L	5.4	0.3	0.14	0.32L	R-6853
R-6854	.8	.5	.18	20L	2.4	.70	6.0	.2	.040	.22	R-6854
R-6857	1.1	.6	.17	880	1.4	1.1	.29	.2	.15	.42	R-6857
R-6861	2.6	1.2L	.33	140	6.7	2.2	.36	1.5	.030	1.8L	R-6861
R-6862	5.0L	2.3L	.53	490	14	2.5	.46L	1.3	.020	1.6L	R-6862
R-6865	2.7L	.8L	.28	36	5.1	.58L	.66	1.1	.080	.58L	R-6865
R-6866	2.7	1.7	.56	76	4.5	2.7	.55	.4	.18	.70	R-6866
R-6867	1.0	.7	.25	20L	2.3	.93	.30	.6	.12	.30L	R-6867
R-6873	4.4L	1.4L	.43	96	6.7	1.1	1.3	1.1	.16	.97L	R-6873
R-6874	9.1L	2.8L	.90	170	13	2.5	1.4L	2.8	.040	2.0L	R-6874
R-6875	2.0	1.4	.29	2,100	2.6	1.9	.19L	.7	.010L	.65L	R-6875
R-6920	1.1L	.5L	.27	48	1.6	.61	.56	.3	.13	.36L	R-6920
R-6922	6.7L	3.1L	.71	160	8.5	2.1L	.61	4.0	.10	2.1L	R-6922
R-6941	5.5L	1.7L	.46	220	8.7	1.2L	7.4	1.0	.070	1.2L	R-6941
R-6943	1.9L	.9L	.27	20L	3.3	1.3	.34	.6	.010	.60L	R-6943
R-6944	6.1L	2.8L	.61	170	10	3.0	1.4	3.5	.020	1.9L	R-6944
R-7069	11L	5.2L	1.3	350	17	5.7	1.0L	5.0	.010	3.6L	R-7069

Table 5b.--Major, minor, and trace element composition of 17 bituminous coal samples from Dickenson County, Virginia 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
R-6853	3	3.9	0.1	9.0	1.4	0.72	2.1L	3.5	22	2.2	R-6853
R-6854	3	3.0	.1	4.0	.82	.68	3.4	10	12	2.6	R-6854
R-6857	4	3.5	.1	5.4	1.8	.93	4.5	21	10	1.6	R-6857
R-6861	12	35	.2	12	1.2	9.7	16	8.9	16	13	R-6861
R-6862	18	53	.2	30	.92	4.4	11	15	30	9.2	R-6862
R-6865	9	22	.2	5.6	1.5	2.9	5.7	11	33	17	R-6865
R-6866	8	17	.2	14	4.1	1.3	14	12	20	5.8	R-6866
R-6867	6	4.2	.1	3.6	1.8	1.8	4.5	4.5	35	5.4	R-6867
R-6873	13	21	.1	32	2.1	1.5	6.4L	11	30	7.9	R-6873
R-6874	33	57	.4	48	1.4	3.1	14	18	190	14	R-6874
R-6875	8	7.3	.1	36	1.1	1.8	5.5	9.3	41	3.1	R-6875
R-6920	6	7.1	.1	16	.66	.26	3.4	4.9	25	2.6	R-6920
R-6922	38	79	.4	17	.61L	9.5	15	13	250	17	R-6922
R-6941	14	34	.2	43	.68	2.2	8.6	14	30	7.5	R-6941
R-6943	8	9.5	.1	24	1.3	1.7	4.3	8.6	26	4.0	R-6943
R-6944	30	89	.3	17	.55L	6.4	18	18	270	18	R-6944
R-7069	47	180	.6	73	1.6	12	44	26	200	21	R-7069

Table 5b.--Major, minor, and trace element composition of 17 bituminous coal samples from Dickenson County, 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
R-6853	11L	1.5	2.1	6.2	0.40	0.54	21	0.2	3.0L	1.9	R-6853
R-6854	13L	1.4	2.0	3.9	.70	.28	22	.2	3.0L	.30	R-6854
R-6857	20L	.30	1.1	2.6	.90	.06L	200	.1	3.0	1.2	R-6857
R-6861	15	.60	2.9	4.4	2.3	1.2	170	.1L	4.0	.36L	R-6861
R-6862	63	.70	6.9	6.7	2.9	.46L	220	.5	4.0	.69L	R-6862
R-6865	16L	.50	2.6	4.3	1.6	1.7	62	.3	4.0	.83L	R-6865
R-6866	16	1.8	4.5	1.4	2.5	.55L	50	.5	3.0L	.78L	R-6866
R-6867	11L	2.1	1.5	2.2	1.4	.60	51	.3	3.0L	.30L	R-6867
R-6873	23	.60	4.0	1.7	2.1	.97L	74	.3	4.0	1.4L	R-6873
R-6874	44	.70	9.8	3.4	4.8	2.0L	99	.7	9.0	2.8L	R-6874
R-6875	10	.30	1.9	2.5	1.5	.19L	170	.3	3.0L	.28L	R-6875
R-6920	23L	.70	2.2	1.3	1.3	.10L	61	.2	3.0L	.20	R-6920
R-6922	75	1.1	10	4.3	4.3	1.8	95	.6	12	.92L	R-6922
R-6941	39	1.6	4.3	2.2L	2.2	1.7	38	.3	3.0L	1.7L	R-6941
R-6943	20L	.40	2.7	1.4	1.4	.17	140	.2	3.0L	.34	R-6943
R-6944	100L	.90	8.5	3.7	3.4	2.2	110	.5	13	.83L	R-6944
R-7069	77	1.0	14	3.5	6.9	3.6L	250	1	14	1.6L	R-7069

Table 5b.--Major, minor, and trace element composition of 17 bituminous coal samples from Dickenson County, 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
R-6853	0.50	6.3	1.8	0.4	3.8	5.0	R-6853
R-6854	.50	9.8	4.8	.5	3.6	4.4	R-6854
R-6857	.30	6.4	6.4	.4	2.8	12	R-6857
R-6861	3.2	22	13	1.0	6.2	130	R-6861
R-6862	2.3	55	11	1.3	15	32	R-6862
R-6865	4.7	9.1	4.2	.8	3.5	16	R-6865
R-6866	2.5	18	12	1.4	20	8.6	R-6866
R-6867	2.0	3.9	4.5	.6	1.5	6.0	R-6867
R-6873	1.9	24	5.3	.9	22	15	R-6873
R-6874	3.6	42	12	2.1	13	37	R-6874
R-6875	1.0	11	10	.7	3.5	40	R-6875
R-6920	1.2	6.1	3.0	.7	6.6	4.0	R-6920
R-6922	3.8	31	8.2	2.3	16	61	R-6922
R-6941	1.2	22	7.5	1.2	21	14	R-6941
R-6943	1.9	11	6.2	.6	5.1	20	R-6943
R-6944	2.8	36	12	2.0	15	42	R-6944
R-7069	5.6	78	31	3.6	39	98	R-7069

Table 5c.--Major, minor, and trace element composition of 1 bituminous coal sample from Lee County, 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 spectrography; 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
R-6923	1.1	0.80	0.067	0.049	0.020	0.14	0.33	0.034	0.01	2.0	R-6923

Table 5c.--Major, minor, and trace element composition of 1 bituminous coal sample from Lee County, 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)	Eu (ppm)	Sample number
R-6923	8.3	45	1.1	0.06	9.0	7.3	8.7	0.8	14	0.19	R-6923

Table 5c.--Major, minor, and trace element composition of 1 bituminous coal sample from Lee County, Virginia 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
R-6923	76	1.3	0.52	0.73	0.2	0.16	5	6.8	0.1	17	R-6923

Table 5c.--Major, minor, and trace element composition of 1 bituminous coal sample from Lee County, Virginia reported on whole-coal basis--continued

Sample number	Mo-S (ppm)	Nb-S (ppm)	Nd-S (ppm)	Ni-S (ppm)	P (ppm)	Pb (ppm)	Rb (ppm)	Sb (ppm)	Sc (ppm)	Se (ppm)	Sample number
R-6923	0.31	0.31	3.2	5.7	16	3.3	11	0.50	1.7	4.2	R-6923

Table 5c.--Major, minor, and trace element composition of 1 bituminous coal sample from Lee County, Virginia reported on whole-coal basis--continued

Sample number	Sm (ppm)	Sr-S (ppm)	Tb (ppm)	Tl-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
R-6923	1.0	110	0.2	0.26	1.2	3.9	1.9	0.5	12	2.7	R-6923

Table 5d.--Major, minor, and trace element composition of 17 bituminous coal samples from Russell County, 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 spectrography; 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
R-6852	2.2	1.1	0.21	0.093	0.015	0.27	0.66	0.079	0.01	9.0	R-6852
R-6856	5.5	2.6	.19	.24	.028	.92	1.3	.15	.02	18	R-6856
R-6863	2.2	1.1	.81	.074	.10	.22	.52	.064	.01	3.0	R-6863
R-6864	7.6	3.5	.74	.040	.087	.81	.80	.24	.03	3.0	R-6864
R-6869	2.4	1.3	1.5	.15	.093	.10	.55	.12	.01	3.0	R-6869
R-6870	3.8	1.7	1.6	.085	.023	.21	.57	.18	.02L	3.0	R-6870
R-6886	3.5	1.8	.31	.11	.027	.33	.88	.13	.03	16	R-6886
R-6887	1.6	.89	.11	.050	.043	.028	.40	.084	.03	4.0	R-6887
R-6888	1.6	.90	.15	.047	.027	.11	.52	.066	.04	5.0	R-6888
R-6917	4.0	2.4	.19	.11	.030	.42	.80	.14	.02L	33	R-6917
R-6918	11	4.2	1.7	.26	.071	1.1	.93	.42	.04L	4.0	R-6918
R-6919	1.9	1.1	1.4	.073	.020	.091	.46	.087	.01L	4.0	R-6919
R-6945	1.5	1.1	.54	.081	.060	.25	.53	.050	.01L	2.0	R-6945
R-6946	.66	.48	.29	.052	.040	.082	.45	.022	.02	7.0	R-6946
R-6947	.65	.46	.50	.045	.020	.085	.54	.023	.02	17	R-6947
R-6948	1.2	.73	.36	.057	.030	.14	.44	.045	.01	2.0	R-6948
R-7161	.75	.55	.18	.021	.010	.017	.39	.026	.02	3.0	R-7161

Table 5d.--Major, minor, and trace element composition of 17 bituminous coal samples from Russell County, Virginia reported on whole-coal basis--continued

Sample number	Au-S (ppm)	B-S (ppm)	Ba-S (ppm)	Be-S (ppm)	Cd (ppm)	Ce (ppm)	Co (ppm)	Cr (ppm)	Cs (ppm)	Cu (ppm)	Sample number
R-6852	0.9L	10	47	2.4	0.04	12	3.1	11	2.0	13	R-6852
R-6856	2.2L	27	120	1.8	.08	22	7.8	20	3.4	22	R-6856
R-6863	1.1L	21	130	1.8	.04	16	4.2	10	.9	15	R-6863
R-6864	2.9L	37	250	2.3	.08	34	5.1	31	2.5	23	R-6864
R-6869	1.4L	39	150	1.4	.03	22	7.6	14	.6	21	R-6869
R-6870	18	18	140	2.1	.06	28	6.4	22	1.3	21	R-6870
R-6886	1.5L	18	120	1.4	.03	24	5.3	22	2.4	15	R-6886
R-6887	.7L	14	77	1.4	.02	15	3.9	11	.2	15	R-6887
R-6888	.7L	10	89	1.8	.03	14	10	11	.4	19	R-6888
R-6917	1.6L	8.2	77	2.0	.07	33	14	22	2.0	26	R-6917
R-6918	4.2L	17	170	2.1	.13	70	3.5	56	3.4	34	R-6918
R-6919	1.1L	4.1	48	.4	.03	16	3.4	12	.4	15	R-6919
R-6945	.8L	8.2	130	1.3	.03	13	7.7	10	1.1	21	R-6945
R-6946	.4L	2.5	73	4.7	.01	8.0	5.1	6.0	.4	9.0	R-6946
R-6947	.4L	2.1	49	6.6	.01	6.0	5.0	5.5	.4	8.2	R-6947
R-6948	.6L	5.9	45	2.5	.02	11	7.4	6.2	.5	16	R-6948
R-7161	.4L	15	21	.8	.04	9.0	1.7	4.5	.7L	13	R-7161

Table 5d.--Major, minor, and trace element composition of 17 bituminous coal samples from Russell County, Virginia 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)	La (ppm)	Sample number
R-6852	3.0L	0.9L	0.22	82	3.1	0.66L	1.8	0.5	0.020	6	R-6852
R-6856	7.1L	2.2L	.37	190	11	1.6L	1.6	.9	.10	11	R-6856
R-6863	3.6L	1.1L	.27	66	3.2	1.5	.57L	.7	.030	8	R-6863
R-6864	9.2L	2.9L	.55	150	10	2.3	1.4	2.1	.040	18	R-6864
R-6869	4.4L	1.4L	.32	54	3.9	1.9	.69L	1.1	.060	13	R-6869
R-6870	5.6L	1.8L	.39	66	5.5	3.0	1.1	1.5	.020	16	R-6870
R-6886	4.8L	1.5L	.38	110	4.4	1.1L	.76L	1.2	.80	13	R-6886
R-6887	2.2L	.9	.29	29	1.9	1.2	.35L	.8	.040	9	R-6887
R-6888	2.4L	.7	.29	39	3.8	.89	1.3	.6	.020	8	R-6888
R-6917	3.6L	1.6L	.59	130	3.9	1.3	.33	1.6	.33	18	R-6917
R-6918	9.2L	4.2L	.90	260	9.2	3.3	.83L	3.3	.14	41	R-6918
R-6919	2.5L	1.1L	.24	48	2.4	1.2	.22L	.7	.10	9	R-6919
R-6945	1.8L	.8L	.22	860	2.2	.92	1.3	.5	.010L	7	R-6945
R-6946	.9L	.4L	.17	200	3.3	.52	2.8	.4	.010L	4	R-6946
R-6947	.9L	.4L	.17	68	4.1	.53	6.6	.3	.010L	3	R-6947
R-6948	1.4L	.6L	.20	60	1.8	.69	.25	.6	.010L	6	R-6948
R-7161	1.2	.4L	.14	64	1.1	.84	.12	.3	.020	6	R-7161

Table 5d.--Major, minor, and trace element composition of 17 bituminous coal samples from Russell County, 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)	Rb (ppm)	Sample number
R-6852	16	0.1	24	0.94	1.4	5.7	5.0	37	3.3	24	R-6852
R-6856	31	.1	71	1.3	2.9	14	13	68	8.2	48	R-6856
R-6863	8.2	.1	36	1.1	2.9	9.1	6.4	20	3.8	23L	R-6863
R-6864	51	.2	37	1.1	8.3	21	12	140	10	48	R-6864
R-6869	22	.1	69	1.4	5.4	9.1	7.0	48	5.7	24L	R-6869
R-6870	28	.2	100	1.6	8.8	15	10	92	7.7	19	R-6870
R-6886	21	.2	33	.76	3.5	8.9	7.2	66	3.8	32	R-6886
R-6887	13	.1	9.8	.98	2.7	9.8	5.5	24	2.9	17L	R-6887
R-6888	9.6	.1	16	1.5	1.2	4.7	9.6	36	4.3	17L	R-6888
R-6917	25	.2	210	1.1	.82	10	12	29	9.7	29	R-6917
R-6918	54	.4	120	.83L	3.3	19L	6.7	36	20	76	R-6918
R-6919	12	.1	84	.56	.78	5.2L	3.9	140	4.5	22L	R-6919
R-6945	13	.1	45	.50	1.0	3.9L	5.5	15	5.7	16	R-6945
R-6946	7.3	.1	37	.34	.30	2.0L	4.7	11	3.5	19L	R-6946
R-6947	9.0	.1	74	.37	.57	1.9L	5.3	13	5.7	19L	R-6947
R-6948	11	.1	29	.32	.63	2.9L	4.5	14	4.0	20L	R-6948
R-7161	6.0	.1L	10	1.2	.68	3.4	8.8	23	2.7	32L	R-7161

Table 5d.--Major, minor, and trace element composition of 17 bituminous coal samples from Russell County, Virginia reported on whole-coal basis--continued

Sample number	Sb (ppm)	Sc (ppm)	Se (ppm)	Sm (ppm)	Sn-S (ppm)	Sr-S (ppm)	Tb (ppm)	Th (ppm)	U (ppm)	V-S (ppm)	Sample number
R-6852	0.40	2.2	2.3	1.0	0.75	44	0.2	3.0L	1.3	12	R-6852
R-6856	1.0	4.1	3.1	1.6	2.4	98	.3	5.0	1.5	29	R-6856
R-6863	.20	2.4	2.9	1.4	.80L	100	.2	5.0	.70	15	R-6863
R-6864	.40	6.9	2.7	2.3	4.0	160	.5	10	2.0	43	R-6864
R-6869	.40	3.0	2.8	1.5	1.1	580	.2	6.0	1.3	15	R-6869
R-6870	.60	4.5	2.7	1.9	2.3	190	.3	6.0	2.0	25	R-6870
R-6886	.50	4.2	3.7	2.1	1.1L	130	.2	4.0	.90	20	R-6886
R-6887	.20	2.4	2.4	1.3	.63	110	.2	3.0L	1.2	11	R-6887
R-6888	1.1	3.2	2.3	1.4	.81	130	.2	5.0	1.2	14	R-6888
R-6917	1.1	4.8	3.0	3.2	.82	61	.4	4.0	2.5	20	R-6917
R-6918	.60	11	4.9	5.3	1.7	180	.7	12	4.3	34	R-6918
R-6919	.40	2.7	1.4	1.3	.67	110	.2	3.0L	1.5	7.4	R-6919
R-6945	.90	3.4	4.3	1.1	.17L	130	.2	3.0L	1.5	8.4	R-6945
R-6946	1.2	1.4	2.3	.80	.09L	140	.2	3.0L	1.0	5.2	R-6946
R-6947	1.8	1.4	2.1	.70	.08L	110	.2	3.0L	1.0	5.7	R-6947
R-6948	.40	1.5	3.1	1.0	.13L	130	.2	3.0L	1.3	5.7	R-6948
R-7161	1.0L	1.2	2.9	.70	.08L	180	.1	3.0L	.20	6.0	R-7161

Table 5d.--Major, minor, and trace element composition of 17 bituminous coal samples from Russell County, Virginia reported on whole-coal basis--continued

Sample number	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)
R-6852	4.0	0.6	10	9.4
R-6856	5.8	.8	49	20
R-6863	9.6	.7	4.6	27
R-6864	14	1.2	13	74
R-6869	8.6	.7	2.9	47
R-6870	14	.9	3.5	110
R-6886	5.7	.9	4.1	18
R-6887	8.4	.7	2.2	36
R-6888	5.6	.8	8.9	8.1
R-6917	4.8	1.4	14	11
R-6918	7.9	2.2	14	32
R-6919	2.9	.6	3.2	13
R-6945	5.4	.7	3.4	10
R-6946	3.1	.6	3.1	3.8
R-6947	3.9	.5	4.9	6.2
R-6948	4.0	.6	2.3	9.5
R-7161	3.6	.2	2.8	7.6

Table 5e.--Major, minor, and trace element composition of 71 bituminous coal samples from Wise County, 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 spectrography; 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
R-6814	4.2	2.4	0.12	0.097	0.040	0.28	0.25	0.13	0.04	1.3	R-6814
R-6815	1.5	.89	.086	.048	.019	.075	.36	.054	.01	68	R-6815
R-6816	2.7	1.6	.11	.055	.015	.13	.28	.092	.07	3.7	R-6816
R-6817	.81	.37	.054	.049	.024	.086	2.6	.017	.03	98	R-6817
R-6818	.86	.68	.078	.029	.023	.096	2.0	.033	.04	97	R-6818
R-6819	.51	.51	.081	.021	.019	.043	2.2	.027	.04	35	R-6819
R-6820	1.4	.50	.10	.060	.026	.096	1.5	.020	.03	1.9	R-6820
R-6821	.81	.69	.044	.020	.029	.026	.14	.030	.03	1.6	R-6821
R-6822	2.3	1.4	.11	.076	.078	.20	1.8	.081	.06	21	R-6822
R-6823	1.5	.76	.057	.044	.038	.12	.25	.038	.08	2.6	R-6823
R-6824	.55	.30	.079	.068	.040	.060	.98	.011	.01L	6.3	R-6824
R-6825	.31	.18	.058	.013	.029	.028	.69	.007	.02	17	R-6825
R-6826	.99	.89	.075	.030	.025	.080	.32	.026	.06	2.0	R-6826
R-6827	2.5	1.6	.042	.042	.020	.24	1.2	.079	.03	85	R-6827
R-6828	.92	.66	.058	.034	.033	.061	.28	.028	.03	3.6	R-6828
R-6829	.94	.84	.038	.021	.020	.13	.78	.029	.02	15	R-6829
R-6830	2.4	1.4	.13	.031	.025	.23	3.4	.083	.09	43	R-6830
R-6831	1.5	.97	.10	.021	.022	.063	3.5	.097	.06	42	R-6831
R-6832	.48	.33	.051	.019	.045	.062	.61	.013	.02	7.0	R-6832
R-6833	.65	.56	.12	.023	.042	.056	1.6	.034	.03	140	R-6833
R-6834	.54	.41	.040	.005	.018	.011	.34	.026	.03	3.0	R-6834
R-6835	2.6	1.2	.16	.041	.040	.10	.22	.090	.02	1.0	R-6835
R-6836	.84	.61	.071	.009	.012	.039	.39	.028	.05	12	R-6836
R-6837	1.8	1.0	.16	.020	.022	.096	.49	.11	.02	4.0	R-6837
R-6838	.71	.51	.15	.043	.052	.081	1.0	.031	.03	20	R-6838
R-6839	1.0	.67	.045	.013	.011	.063	.12	.035	.04	1.0	R-6839
R-6840	.53	.40	.039	.013	.051	.029	.10	.025	.02	2.0	R-6840
R-6841	2.6	1.4	.071	.041	.021	.38	.41	.11	.04	3.0	R-6841
R-6842	.65	.29	.046	.019	.038	.071	.55	.011	.02	18	R-6842
R-6844	1.3	1.1	.10	.026	.040	.081	.17	.035	.04	2.0	R-6844
R-6845	.83	.58	.64	.16	.077	.11	4.6	.035	.05	45	R-6845
R-6846	1.4	1.2	.41	.065	.040	.19	.49	.055	.03	14	R-6846
R-6847	2.5	1.3	.082	.055	.036	.14	.50	.092	.03	7.0	R-6847
R-6848	4.1	2.2	.087	.14	.040	.60	2.2	.11	.06	78	R-6848
R-6849	1.8	.90	.12	.025	.032	.053	.44	.068	.04	16	R-6849
R-6850	1.1	.56	.10	.022	.011	.069	2.2	.049	.04	15	R-6850
R-6851	2.7	2.0	.096	.061	.020	.27	1.7	.080	.11	34	R-6851
R-6855	1.6	1.0	.091	.051	.017	.16	2.8	.040	.04	37	R-6855
R-6858	1.2	.76	.11	.016	.026	.093	1.0	.037	.03	1.0	R-6858
R-6859	8.7	4.8	.049	.24	.070	1.1	.93	.23	.03L	7.0	R-6859

Table 5e.--Major, minor, and trace element composition of 71 bituminous coal samples from Wise County, Virginia 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
R-6814	28	180	2.3	0.08	24	B	8.7	22	1.6	18	R-6814
R-6815	11	78	2.3	.10	6.0	B	7.8	5.5	.3	16	R-6815
R-6816	16	150	4.4	.15	25	B	11	17	.5	20	R-6816
R-6817	12	41	1.5	.06	4.0	B	1.9	4.2	.3	12	R-6817
R-6818	12	82	1.7	.07	8.0	B	3.1	7.8	.4	11	R-6818
R-6819	11	91	2.3	.06	6.0	B	2.3	5.0	.2	10	R-6819
R-6820	22	95	1.5	.05	14	B	3.2	11	.4	12	R-6820
R-6821	11	58	3.5	.07	9.0	B	9.5	5.7	.1	15	R-6821
R-6822	13	160	2.7	.15	17	B	6.5	14	1.0	22	R-6822
R-6823	14	74	5.2	.11	16	B	21	12	.4	22	R-6823
R-6824	9.9	65	.9	.04	4.0	B	5.4	4.2	.3	11	R-6824
R-6825	8.2	38	1.3	.10	4.0	B	12	4.2	.1	12	R-6825
R-6826	19	86	2.6	.05	15	B	6.0	6.7	.3	15	R-6826
R-6827	9.8	64	4.4	.09	21	360	5.9	16	2.1	18	R-6827
R-6828	17	86	2.3	.02	11	B	1.6	4.9	.2	6.9	R-6828
R-6829	9.0	43	2.0	.07	9.0	250	1.8	7.8	.7	12	R-6829
R-6830	9.1	80	3.0	.17	19	B	5.3	15	.9	21	R-6830
R-6831	14	120	.9	.07	14	B	4.3	13	.3	15	R-6831
R-6832	13	57	1.1	.05	5.0	B	4.1	4.7	.3	9.3	R-6832
R-6833	13	130	1.5	.07	6.0	B	4.1	6.8	.4	11	R-6833
R-6834	7.0	49	.5	.03	8.0	B	1.7	4.0	.1	9.2	R-6834
R-6835	14	100	1.4	.09	24	B	6.5	18	.5	14	R-6835
R-6836	10	42	1.8	.16	17	B	4.5	6.5	.2	18	R-6836
R-6837	12	160	1.6	.09	19	B	11	17	.4	15	R-6837
R-6838	28	82	.4	.09	7.0	B	2.2	6.6	.5	9.7	R-6838
R-6839	7.1	210	2.3	.02	8.0	B	13	6.1	.2	10	R-6839
R-6840	10	55	.9	.06	10	B	7.1	16	.5L	10	R-6840
R-6841	12	41	1.8	.11	22	B	7.8	19	.5	17	R-6841
R-6842	10	44	1.2	.05	4.0	B	2.9	3.0	.0	13	R-6842
R-6844	13	98	3.7	.10	21	400	8.8	12	4.0	16	R-6844
R-6845	H	67	.8	.11	11	B	4.0	8.7	.4	12	R-6845
R-6846	17	84	1.6	.29	23	210	6.1	13	.8	17	R-6846
R-6847	14	61	1.7	.12	17	B	3.5	13	.8	15	R-6847
R-6848	28	92	2.4	.23	27	B	11	24	1.7	28	R-6848
R-6849	15	110	1.5	.06	15	B	4.3	11	.2	11	R-6849
R-6850	7.5	62	1.3	.05	8.0	B	4.2	7.4	.2	11	R-6850
R-6851	15	110	2.3	.47	37	650	6.7	20	1.3	32	R-6851
R-6855	9.6	36	1.9	.10	12	B	13	11	.3	19	R-6855
R-6858	13	42	1.1	.04	15	B	3.9	7.3	.4	9.2	R-6858
R-6859	36	200	3.6	.25	60	220	15	42	3.1	28	R-6859

Table 5e.--Major, minor, and trace element composition of 71 bituminous coal samples from Wise County, Virginia 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
R-6814	8.9L	2.8L	0.40	20L	6.6	2.0	1.3L	1.0	0.020	1.8L	R-6814
R-6815	3.5L	1.1L	.17	46	2.2	1.2	.72	.3	.050	.72L	R-6815
R-6816	5.9L	2.8	.57	92	4.8	3.2	.85L	.8	.060	1.2L	R-6816
R-6817	4.0L	1.2L	.10	42	2.0	1.4	.57L	.2	.16	.83L	R-6817
R-6818	3.9L	1.2L	.17	170	3.3	.82L	3.1	.3	.24	.82L	R-6818
R-6819	3.3L	1.0L	.13	160	2.6	.68L	1.5	.2	.15	.68L	R-6819
R-6820	3.9L	1.2L	.23	47	3.5	.82L	.56L	.6	.020	.82L	R-6820
R-6821	2.1L	.8	.25	140	3.0	.72	3.6	.3	.020	.43L	R-6821
R-6822	6.5L	2.0L	.39	140	5.7	1.3L	1.5	.6	.073	1.3L	R-6822
R-6823	3.3L	1.9	.46	110	4.8	1.7	5.7	.4	.030	.68L	R-6823
R-6824	2.4L	.8L	.12	150	2.0	.57	.68	.1	.030	.53L	R-6824
R-6825	1.5L	.5L	.12	22	1.5	.62	1.2	.2	.050	.34L	R-6825
R-6826	3.1L	1.2	.27	28	3.0	1.2	.44L	.4	.010L	.67L	R-6826
R-6827	2.8	1.1L	.41	32	5.3	2.1	1.3	.7	.10	.77L	R-6827
R-6828	2.8L	.9L	.15	46	2.6	.95	.40L	.6	.29	.60L	R-6828
R-6829	1.5	.5	.20	20	3.5	1.2	.37	.3	.10	.37L	R-6829
R-6830	8.8L	2.8L	.36	100	6.3	1.9L	2.1	.7	.26	1.9L	R-6830
R-6831	6.9L	2.2L	.26	78	5.2	1.5L	1.0	.9	.27	1.5L	R-6831
R-6832	1.9L	.6L	.09	46	1.6	.42	.28L	.1	.050	.42L	R-6832
R-6833	3.6L	1.1L	.15	54	3.0	1.1	1.3	.3	.23	.78L	R-6833
R-6834	1.7L	.5L	.15	42	1.2	.54	.25L	.3	.070	.38L	R-6834
R-6835	3.0L	.9	.30	140	4.5	.66L	1.3	1.1	.040	.66L	R-6835
R-6836	1.4L	.7	.34	60	2.5	.34	1.3	.4	.21	.30L	R-6836
R-6837	2.5L	.9	.34	130	4.4	.54L	2.5	.9	.080	.54L	R-6837
R-6838	1.6L	.5L	.15	37	2.1	.66	.31	.3	.15	.36L	R-6838
R-6839	1.3L	.7	.19	22	3.7	.80	3.3	.4	.010	.42L	R-6839
R-6840	.8L	.3	.28	20L	1.6	.43	.78	.4	.020	.18L	R-6840
R-6841	3.2L	1.0	.41	75	4.2	.69L	1.2	1.0	.11	.69L	R-6841
R-6842	1.1L	.4	.15	20L	1.8	.71	.95	.6	.090	.24L	R-6842
R-6844	2.1	1.1	.40	54	4.8	1.6	3.0	.4	.010	.49	R-6844
R-6845	4.4L	1.4L	.29	70	3.0	2.0	2.6	.3	.22	.95L	R-6845
R-6846	1.8L	1.0	.52	610	3.4	2.1	.42	.5	.11	.59L	R-6846
R-6847	3.1L	1.0L	.23	58	4.5	1.2	1.3	.7	.12	.67L	R-6847
R-6848	6.0L	1.9L	.45	120	8.6	1.3L	1.3	.8	.33	1.3L	R-6848
R-6849	2.3L	1.1	.25	63	4.0	.99	.71	.7	.10	.71L	R-6849
R-6850	2.4L	.8L	.15	80	3.9	1.4	1.7	.4	.18	.53L	R-6850
R-6851	3.5	1.6	.73	320	6.4	2.8	.27L	.8	.18	.94L	R-6851
R-6855	3.4L	1.1L	.30	63	3.8	.74L	1.3	.3	.24	.74L	R-6855
R-6858	1.6L	.9	.35	38	1.8	.97	.26	.7	.11	.36L	R-6858
R-6859	7.2L	3.3L	.99	360	13	5.2	.65L	2.0	.020	2.3L	R-6859

Table 5e.--Major, minor, and trace element composition of 71 bituminous coal samples from Wise County, Virginia 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
R-6814	14	39	0.1	12	1.3	6.5	23	18	540	6.8	R-6814
R-6815	3	3.4	.1	78	2.0	.53	5.0L	9.0	260	1.4	R-6815
R-6816	14	20	.2	8.2	2.4	3.9	35	22	450	5.9	R-6816
R-6817	2	3.2	.1	19	2.5	.40L	5.7L	4.0	30	.83	R-6817
R-6818	4	8.2	.1	20	1.8	.95	5.9	6.4	15	1.6	R-6818
R-6819	3	5.5	.1	10	2.1	.74	4.7L	3.8	25	1.3	R-6819
R-6820	8	8.2	.1	.7	1.2	1.2	10	8.2	59	3.0	R-6820
R-6821	5	3.2	.1	7.9	1.2	.86	9.0	10	11	2.6	R-6821
R-6822	9	11	.2	7.2	4.3	1.5	9.7	20	690	4.9	R-6822
R-6823	7	6.3	.3	7.4	2.1	1.0	21	21	220	4.3	R-6823
R-6824	2	1.9	.1	28	2.0	.26	3.5L	6.1	83	.87	R-6824
R-6825	2	.9	.1	6.0	2.4	.34	3.1	14	8	1.1	R-6825
R-6826	7	8.6	.1	4.7	2.1	1.1	13	8.2	4	5.3	R-6826
R-6827	11	19	.2	8.8	1.2	4.0	13	12	48	5.2	R-6827
R-6828	5	5.6	.1	6.5	2.3	2.8	8.6	5.2	19	4.7	R-6828
R-6829	5	6.9	.1	12	1.6	1.5	6.9	4.1	25	3.1	R-6829
R-6830	10	15	.2	30	4.1	2.6	13L	17	360	6.3	R-6830
R-6831	8	8.7	.1	13	2.8	2.6	9.9L	9.7	190	2.6	R-6831
R-6832	2	2.1	.1	3.6	2.8	.19L	2.8L	6.6	3	1.7	R-6832
R-6833	4	3.4	.1	15	1.5	.78	5.3	5.4	73	1.0	R-6833
R-6834	5	3.0	.1	4.9	.92	.92	5.4	4.1	47	2.3	R-6834
R-6835	14	16	.2	17	.94	2.1	4.3L	6.2	620	4.6	R-6835
R-6836	8	8.2	.1	12	1.5	.95	2.1	6.5	8	3.7	R-6836
R-6837	10	11	.2	25	2.4	2.2	3.9	15	540	11	R-6837
R-6838	4	2.6	.1	23	.97	.51	2.3L	2.7	22	61	R-6838
R-6839	4	4.6	.1	3.8	1.6	.92	6.3	14	28	1.2	R-6839
R-6840	3	6.3	.1	8.0	.80	.50	1.2L	7.5	21	1.9	R-6840
R-6841	12	15	.2	14	1.5	3.1	4.6L	9.9	120	7.9	R-6841
R-6842	2	2.4	.1	7.1	2.2	.41	2.6	4.4	24	1.6	R-6842
R-6844	12	9.8	.2	4.8	1.6	1.7	12	15	430	3.6	R-6844
R-6845	6	45	.1	31	2.7	1.1	6.3L	6.0	59	1.4L	R-6845
R-6846	12	15	.2	36	.92	1.3	11	20	51	4.5	R-6846
R-6847	9	26	.1	12	1.2	3.1	9.0	8.8	160	5.1	R-6847
R-6848	17	39	.2	19	3.6	.94	8.6L	21	41	8.8	R-6848
R-6849	8	7.1	.1	3.6	1.1	1.6	5.2	11	400	3.2	R-6849
R-6850	4	9.8	.1	19	1.5	1.2	3.8	6.5	260	5.4	R-6850
R-6851	22	39	.2	8.3	3.8	1.7	20	21	47	.09	R-6851
R-6855	7	17	.2	20	3.2	1.2	6.4	19	130	6.3	R-6855
R-6858	7	8.2	.1	5.0	.97	.82	11	6.1	11	2.9	R-6858
R-6859	33	75	.4	46	.65L	7.8	36	39	110	12	R-6859

Table 5e.--Major, minor, and trace element composition of 71 bituminous coal samples from Wise County, 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
R-6814	22	0.34	4.3	1.5	2.2	1.8L	340	0.3	5.0	2.8L	R-6814
R-6815	13L	.87	1.5	2.4	.70	.72L	60	.1	3.0L	2.8	R-6815
R-6816	14L	.37	3.6	1.7	2.9	1.2L	280	.5	6.0	1.8L	R-6816
R-6817	10L	.82	1.3	4.4	.50	.83L	52	.2	3.0L	1.2L	R-6817
R-6818	8	.91	2.1	7.6	.80	.82L	68	.1	3.0L	1.2L	R-6818
R-6819	11L	.37	1.5	7.0	.60	.68L	97	.1	3.0L	1.0L	R-6819
R-6820	15L	.37	2.1	1.3	1.3	.82L	180	.2	3.0L	1.2L	R-6820
R-6821	11L	.50	1.7	3.3	1.1	.43L	58	.2	3.0	.65L	R-6821
R-6822	15	2.5	3.4	1.8	1.6	1.3L	200	.2	3.0L	2.0L	R-6822
R-6823	15L	.78	3.0	1.5	2.1	.68L	39	.4	3.0	1.0L	R-6823
R-6824	11L	.70	1.8	2.1	.50	.53L	49	.1	3.0L	.76L	R-6824
R-6825	11L	.77	1.3	1.7	.60	.48	41	.1	3.0L	.48L	R-6825
R-6826	13L	.23	1.9	2.7	1.7	1.2	140	.3	3.0L	.96L	R-6826
R-6827	28	1.2	3.9	4.9	2.0	.22L	130	.4	3.0	2.3	R-6827
R-6828	12L	.31	1.4	2.2	1.0	.73	190	.2	3.0L	.86L	R-6828
R-6829	30	.40	2.4	4.6	1.0	.11L	69	.2	3.0L	.16L	R-6829
R-6830	19	1.1	4.1	2.7	1.7	1.9L	110	.4	3.0	2.8L	R-6830
R-6831	14L	.55	2.7	3.2	1.2	1.5L	160	.2	4.0	2.2L	R-6831
R-6832	12L	.62	1.3	2.5	.50	.57	57	.1	3.0L	.60L	R-6832
R-6833	14L	.96	1.9	6.0	.60	.78L	130	.1	3.0L	3.2	R-6833
R-6834	10L	.15	.90	2.5	.70	1.6	86	.1	3.0L	.54L	R-6834
R-6835	24L	.40	3.5	1.5	1.9	.66L	150	.3	3.0L	.94L	R-6835
R-6836	15L	.50	2.1	3.6	1.9	.65	77	.4	3.0L	1.4	R-6836
R-6837	19L	.90	3.8	1.2	1.7	3.2	77	.3	3.0L	.77	R-6837
R-6838	15L	19	1.4	6.8	.70	14	61	.5L	3.0L	.51L	R-6838
R-6839	10	.60	2.3	1.3	.80	.71	21	.1	3.0L	.42L	R-6839
R-6840	22L	.30	1.9	3.1	.60	.18L	40	.6L	3.0L	.30	R-6840
R-6841	19L	.70	4.3	2.9	2.1	.69L	43	.3	4.0	.99L	R-6841
R-6842	24L	.80	1.5	2.1	.50	.24L	44	.6L	3.0L	.88	R-6842
R-6844	20L	.70	3.5	1.3	1.9	.12L	220	.3	3.0L	.18L	R-6844
R-6845	18L	.30	2.0	2.0	1.2	.95L	52	.5L	3.0L	1.4L	R-6845
R-6846	15	.30	3.1	3.3	2.7	.17L	84	.4	3.0L	.25L	R-6846
R-6847	27L	.40	2.9	2.5	1.5	.67L	110	.8L	3.0L	.96L	R-6847
R-6848	30	1.4	5.6	2.7	2.5	1.3L	39	.7L	7.0	3.9	R-6848
R-6849	28L	.40	2.8	1.1	1.2	.50L	160	.8L	3.0L	.78	R-6849
R-6850	11L	.80	1.8	3.4	.60	.83	45	.3L	3.0L	.75L	R-6850
R-6851	21	1.0	4.2	2.4	3.5	.27L	310	.6	3.0L	.40L	R-6851
R-6855	16L	1.6	2.9	2.8	1.4	1.3	50	.2	3.0L	1.1L	R-6855
R-6858	7	.20	1.7	1.6	1.6	.36L	40	.3	3.0L	.51L	R-6858
R-6859	76	.80	9.5	3.1	5.4	.65L	150	.8	9.0	.98L	R-6859

Table 5e.---Major, minor, and trace element composition of 71 bituminous coal samples from Wise County, Virginia reported on whole-coal basis--continued

Sample number	Tm-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
R-6814	1.3L	1.2	39	15	0.9	10	89	R-6814
R-6815	.50L	.80	8.4	5.3	1.5	72	4.1	R-6815
R-6816	.85L	.90	34	26	1.5	26	46	R-6816
R-6817	.57L	1.1	9.0	3.4	.3	28	4.3	R-6817
R-6818	.56L	.70	9.5	3.7	.5	4.2	8.8	R-6818
R-6819	.47L	.70	5.4	3.9	.4	3.0	8.0	R-6819
R-6820	.56L	1.3	17	6.1	.6	5.8	15	R-6820
R-6821	.30L	.30	11	7.2	.7	2.0	8.6	R-6821
R-6822	.93L	2.2	25	6.9	.9	29	15	R-6822
R-6823	.47L	.70	24	18	1.4	13	10	R-6823
R-6824	.35L	.50	5.3	2.3	.3	5.3	2.1	R-6824
R-6825	.22L	.50	4.1	3.8	.8	34	1.7	R-6825
R-6826	.44L	1.3	12	8.6	.8	3.1	11	R-6826
R-6827	.55L	1.2	28	14	1.1	7.8	40	R-6827
R-6828	.40L	1.4	7.3	7.3	.5	4.3	17	R-6828
R-6829	.27L	1.7	17	8.0	.6	5.8	16	R-6829
R-6830	1.3L	1.5	23	8.8	1.1	18	13	R-6830
R-6831	.99L	1.6	15	5.6	.7	5.5	24	R-6831
R-6832	.28L	.40	7.2	3.3	.4	5.7	2.3	R-6832
R-6833	.52L	.60	6.2	3.2	.4	3.6	7.3	R-6833
R-6834	.25L	.40	5.1	3.2	.3	2.7	12	R-6834
R-6835	.47L	1.6	17	2.5	.7	3.8	10	R-6835
R-6836	.22L	.80	6.5	3.2	.8	4.7	4.3	R-6836
R-6837	.39L	2.5	17	4.8	1.0	9.2	8.5	R-6837
R-6838	.26L	1.3	4.9	1.8	.3	7.1	3.7	R-6838
R-6839	.21L	.90	12	6.3	.5	12	9.2	R-6839
R-6840	.13L	.40	3.3	1.9	.5	2.5	2.8	R-6840
R-6841	.50L	3.3	18	4.6	1.0	16	17	R-6841
R-6842	.17L	.70	6.1	3.4	.4	9.2	2.0	R-6842
R-6844	.31L	.80	31	13	1.1	39	15	R-6844
R-6845	.68L	.80	7.3	2.9	.5	94	5.4	R-6845
R-6846	.42L	1.9	13	11	1.2	32	20	R-6846
R-6847	.48L	1.5	17	6.7	.5	8.8	21	R-6847
R-6848	.94L	2.6	28	5.1	1.2	41	8.6	R-6848
R-6849	.50L	1.2	16	6.1	.7	2.6	9.9	R-6849
R-6850	.38L	.80	6.8	2.3	.3	14	6.7	R-6850
R-6851	.67L	2.3	34	16	1.5	44	20	R-6851
R-6855	.53L	2.6	18	8.1	.9	9.8	13	R-6855
R-6858	.26L	.90	10	7.1	.7	6.6	9.7	R-6858
R-6859	1.6L	2.8	85	28	2.2	49	95	R-6859

Table 5e.--Major, minor, and trace element composition of 71 bituminous coal samples from Wise County, 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
R-6860	1.5	1.0	0.070	0.030	0.019	0.13	0.31	0.077	0.03	3.0	R-6860
R-6868	2.2	1.4	.42	.13	.040	.25	.66	.078	.01L	8.0	R-6868
R-6871	2.6	1.6	.065	.046	.021	.19	.67	.096	.02	10	R-6871
R-6872	2.9	1.6	1.5	.10	.037	.087	.74	.13	.02L	13	R-6872
R-6908	1.6	1.5	.17	.041	.030	.22	.34	.075	.03	4.0	R-6908
R-6909	.63	.61	.13	.032	.020	.091	1.7	.031	.03	8.0	R-6909
R-6910	.57	.32	.050	.013	.030	.008	.15	.030	.02	1.0	R-6910
R-6911	1.9	1.2	.038	.032	.020	.18	.31	.084	.05	78	R-6911
R-6912	1.1	.73	.16	.020	.030	.051	.14	.052	.03	2.0	R-6912
R-6913	1.4	.97	.105	.021	.020	.12	.16	.053	.02	2.0	R-6913
R-6914	3.6	2.3	.066	.11	.029	.47	.43	.10	.01	3.0	R-6914
R-6915	3.6	1.9	.064	.077	.030	.38	.48	.096	.03	2.0	R-6915
R-6916	2.0	1.1	.077	.044	.040	.16	.20	.069	.05	2.0	R-6916
R-6934	B	B	B	.016	.020	B	B	B	.01	2.0	R-6934
R-6935	.73	.52	.046	.020	.040	.045	.21	.035	.02	2.0	R-6935
R-6936	5.6	3.8	.087	.12	.069	.84	.40	.17	.09	1.0	R-6936
R-6937	1.8	1.0	.21	.047	.050	.14	.36	.066	.20	1.0	R-6937
R-6938	1.3	.85	.092	.043	.030	.12	3.1	.055	.06	16	R-6938
R-6939	.84	.68	.070	.019	.030	.048	1.2	.049	.02	15	R-6939
R-6940	4.3	2.8	.083	.11	.070	.62	.55	.13	.07	4.0	R-6940
R-7068	1.2	.78	.10	.026	.010	.059	1.3	.050	.03	47	R-7068
R-7070	1.1	.63	.058	.022	.010	.081	1.0	.036	.01	29	R-7070
R-7071	1.2	.75	.044	.013	.020	.034	.21	.051	.01	3.0	R-7071
R-7072	2.5	1.5	.16	.10	.020	.27	.66	.083	.02	17	R-7072
R-7073	2.1	1.4	.20	.086	.020	.22	.51	.072	.01	10	R-7073
R-7160	.42	.28	.090	.011	.020	.015	.31	.014	.01	13	R-7160
R-7168	.57	.52	.087	.019	.040	.032	.51	.031	.03	7.0	R-7168
R-7169	1.4	.84	.052	.033	.020	.17	.51	.040	.04	12	R-7169
R-7171	.62	.45	.19	.052	.070	.043	.39	.028	.02	3.0	R-7171
R-7174	1.4	.62	.10	.026	.020	.056	.39	.057	.01	10	R-7174
R-7175	1.2	.70	.091	.015	.020	.057	.23	.044	.02	4.0	R-7175

Table 5e.--Major, minor, and trace element composition of 71 bituminous coal samples from Wise County, Virginia 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
R-6860	13	54	1.0	0.05	14	B	5.8	9.9	0.4	16	R-6860
R-6868	38	120	1.4	.05	12	850	2.5	11	1.7	14	R-6868
R-6871	10	42	2.7	.07	30	B	14	16	.5	27	R-6871
R-6872	30	110	1.4	.03	25	B	4.4	18	.5	23	R-6872
R-6908	14	180	.9	.13	22	B	7.2	15	.9	26	R-6908
R-6909	24	96	1.7	.10	26	B	15	21	.6	14	R-6909
R-6910	5.8	33	1.6	.02	6.0	B	6.6	3.7	.8L	11	R-6910
R-6911	12	50	1.6	.08	5.0	B	2.2	5.7	.3	21	R-6911
R-6912	16	140	1.0	.14	13	B	16	9.3	.3	11	R-6912
R-6913	5.0	36	2.2	.02	14	B	14	9.8	.5	16	R-6913
R-6914	10	82	1.3	.10	23	B	5.4	23	1.5	20	R-6914
R-6915	12	84	1.6	.07	13	B	1.9	7.8	.9	19	R-6915
R-6916	18	100	1.2	.07	18	B	2.3	9.7	1.2	18	R-6916
R-6934	13	21	.5	.04	7.0	B	2.6	3.7	.3	9.5	R-6934
R-6935	8.8	48	1.1	.04	8.0	B	6.6	4.4	.3	12	R-6935
R-6936	28	190	3.3	.10	36	B	13	35	2.0	37	R-6936
R-6937	16	190	.8	.27	18	B	11	10	.6	28	R-6937
R-6938	19	79	1.1	.30	12	B	2.2	12	.8	16	R-6938
R-6939	9.3	37	.8	.12	10	B	12	8.8	.3	8.1	R-6939
R-6940	19	170	1.6	.10	31	B	6.1	21	2.7	24	R-6940
R-7068	19	30	.6	.08	10	110	4.6	9.0	.2	13	R-7068
R-7070	6.5	22	.8	.01	9.0	B	1.2	8.1	.3	5.9	R-7070
R-7071	5.2	24	2.5	.06	13	B	7.7	7.4	.1	15	R-7071
R-7072	13	54	2.0	.06	23	B	12	17	1.2	22	R-7072
R-7073	16	54	1.2	.09	24	B	9.6	22	1.0	24	R-7073
R-7160	6.0	16	.5	.03	2.0	B	6.6	5.0L	.1	8.5	R-7160
R-7168	13	39	.6	.09	9.0	B	8.6	6.4	.4	13	R-7168
R-7169	8.5	50	1.7	.21	11	B	11	11	.6	26	R-7169
R-7171	7.3	250	.7	.04	7.0	160	12	6.2	.4	7.3	R-7171
R-7174	7.3	73	2.5	.05	16	130	4.5	9.8	.3	13	R-7174
R-7175	7.8	150	1.5	.06	12	390	9.9	7.5	.3	11	R-7175

Table 5e.--Major, minor, and trace element composition of 71 bituminous coal samples from Wise County, Virginia 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
R-6860	2.0L	1.0	0.20	62	3.1	0.73	0.49	0.6	0.070	0.43L	R-6860
R-6868	2.5	1.1L	.23	820	4.1	1.4	.44	.6	.010L	.76L	R-6868
R-6871	3.4L	1.1L	.37	70	4.0	.75	1.6	.9	.11	.75L	R-6871
R-6872	4.8L	1.5L	.35	64	3.8	1.5	.76L	1.2	.060	1.1L	R-6872
R-6908	2.7L	.8L	.39	76	4.5	.67	2.0	.7	.28	.59L	R-6908
R-6909	2.0L	.6L	.53	160	3.8	.45L	7.0	1.0	.26	.45L	R-6909
R-6910	.8L	.3L	.12	20L	1.5	.55	1.0	.3	.10	.18L	R-6910
R-6911	2.5L	.8L	.10	68	6.0	.55L	2.1	.4	.20	.55L	R-6911
R-6912	1.6L	.6	.22	200	2.4	.87	1.4	.5	.10	.36L	R-6912
R-6913	1.3L	.6L	.35	59	1.8	.71	1.3	.4	.090	.41L	R-6913
R-6914	3.1L	1.4L	.38	150	3.6	1.3	.28L	.8	.090	.99L	R-6914
R-6915	2.9L	1.3L	.17	96	3.6	1.5	.27	.4	.16	.93L	R-6915
R-6916	2.5L	.8L	.37	220	4.0	.54L	.39	.8	.060	.54L	R-6916
R-6934	.5L	.2L	.17	20L	1.2	.34	.15	.3L	.010L	.15L	R-6934
R-6935	.8	.4	.15	20L	2.3	.54	.65	.4	.010L	.24L	R-6935
R-6936	7.0L	2.2L	.65	300	12	1.7	1.1L	1.5	.030	1.5L	R-6936
R-6937	2.5L	.8L	.38	72	4.2	1.0	.40L	.7	.090	.55L	R-6937
R-6938	3.4L	1.1L	.23	68	3.3	.75L	.75	.5	.24	.75L	R-6938
R-6939	1.9L	.6L	.20	60	3.0	.87	1.2	.4	.24	.41L	R-6939
R-6940	5.6L	2.1	.51	92	8.5	1.9	.87	1.1	.12	1.2L	R-6940
R-7068	1.4L	.6L	.19	120	2.0	.45L	.45	.5	.21	.45L	R-7068
R-7070	1.2L	.5L	.16	28	2.2	.70	2.5	.4	.29	.38L	R-7070
R-7071	1.0L	.6	.26	29	2.6	.99	1.5	.6	.020	.33L	R-7071
R-7072	2.3L	1.1L	.52	20L	3.5	1.5	1.1	.7	.040	.74L	R-7072
R-7073	2.0L	1.1	.52	1,900	3.2	1.0	.19L	.6	.040	.65L	R-7073
R-7160	.5L	.2L	.08	68	.6	.41	.18	.4L	.060	.16L	R-7160
R-7168	.8	.4	.24	140	1.5	.60	1.1	.4	.17	.25L	R-7168
R-7169	1.6	.9	.31	130	3.0	1.2	.98	.4	.010	.49	R-7169
R-7171	.9L	.4L	.12	27	2.6	.60	3.6	.3	.010L	.30L	R-7171
R-7174	1.7	.6L	.31	23	2.4	.90	.17	.7	.020	.84L	R-7174
R-7175	1.5	.5	.21	60	2.0	.88	2.4	.5	.010L	.34L	R-7175

Table 5e.--Major, minor, and trace element composition of 71 bituminous coal samples from Wise County, Virginia 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
R-6860	8	9.8	0.1	4.9	1.2	1.8	7.9	9.2	110	4.7	R-6860
R-6868	7	20	.1	28	1.9	1.5	5.0L	7.2	57	3.3	R-6868
R-6871	16	22	.2	52	.96	1.2	4.9L	15	56	9.6	R-6871
R-6872	15	24	.2	47	2.4	2.3	6.9L	7.6	220	3.9	R-6872
R-6908	12	15	.1	12	.84	1.0	7.6	10	810	8.4	R-6908
R-6909	14	7.7	.1	24	1.5	.83	2.9L	5.0	20	2.0	R-6909
R-6910	4	2.3	.1	13	.38	1.0	2.8	11	5	1.8	R-6910
R-6911	3	24	.1	5.7	1.4	1.2	4.8	12	24	9.4	R-6911
R-6912	8	5.6	.1	3.0	.77	2.0	4.0	19	780	2.9	R-6912
R-6913	7	10	.1	3.3	.12L	.59	4.5	7.7	10	5.9	R-6913
R-6914	14	23	.2	14	.71	.99	8.0	9.2	62	9.5	R-6914
R-6915	8	10	.1	10	.80	1.3	9.7	8.6	35	7.8	R-6915
R-6916	10	15	.1	5.1	.69	1.2	4.2	5.2	24	6.2	R-6916
R-6934	3	1.9	.1	19	.82	.17	1.0	2.5	B	1.6	R-6934
R-6935	5	4.4	.1	9.2	1.1	.95	2.8	7.5	9	3.4	R-6935
R-6936	20	50	.2	31	1.3	4.6	28	15	67	18	R-6936
R-6937	10	10	.1	43	.87	.79	3.6L	26	21	7.3	R-6937
R-6938	6	8.7	.1	18	12	2.9	7.4	6.8	28	2.6	R-6938
R-6939	5	4.7	.1	8.7	.87	1.2	2.7L	10	170	2.0	R-6939
R-6940	17	19	.2	28	.87	2.8	19	13	46	10	R-6940
R-7068	5	7.7	.1	5.3	1.5	1.3	5.2	6.1	150	3.7	R-7068
R-7070	5	11	.1	11	1.5	1.1	3.9	3.7	50	2.8	R-7070
R-7071	7	12	.1	2.4	1.2	1.6	5.2	13	76	4.4	R-7071
R-7072	11	34	.2	21	1.2	1.6	10	12	37	7.0	R-7072
R-7073	11	26	.2	23	1.0	1.1	8.0	9.3	65	7.6	R-7073
R-7160	1	3.0	.1	6.4	.64	.23	1.2	4.4	17	1.3	R-7160
R-7168	5	4.2	.1	5.6	1.3	.56	4.6	10	47	2.9	R-7168
R-7169	7	9.8	.2	5.9	2.1	.67	6.7	11	32	5.4	R-7169
R-7171	4	6.0	.1	11	.69	.56	2.1	7.7	1	.77	R-7171
R-7174	9	7.3	.1	29	.45	2.2	8.4	8.4	4	4.7	R-7174
R-7175	6	7.8	.1	2.9	1.3	1.8	5.4	17	21	4.1	R-7175

Table 5e.--Major, minor, and trace element composition of 71 bituminous coal samples from Wise County, 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
R-6860	14L	0.30	2.8	1.7	1.1	0.79	67	0.2	3.0L	0.61L	R-6860
R-6868	24	.40	2.6	1.9	1.1	.22L	370	.2	3.0	.33L	R-6868
R-6871	13	.60	2.8	4.0	2.6	.75L	43	.4	3.0L	1.1L	R-6871
R-6872	7	.90	4.1	2.9	1.9	1.1L	180	.3	5.0	1.5L	R-6872
R-6908	45L	.70	3.4	4.0	2.0	1.1	240	.3	3.0L	1.0	R-6908
R-6909	27L	.90	4.1	7.6	2.3	.51	83	.4	3.0L	.64L	R-6909
R-6910	32L	.20	.90	1.6	.60	.18L	57	.1	3.0L	.38L	R-6910
R-6911	21L	.60	1.9	6.4	.50	.55L	41	.5L	3.0L	1.2	R-6911
R-6912	33L	1.1L	1.9	1.2	1.1	.36L	270	.5L	3.0L	.51L	R-6912
R-6913	27L	1.6	2.7	2.0	1.7	.18	40	.3	3.0L	.18L	R-6913
R-6914	49	.60	4.2	2.9	2.2	.43	40	.3	3.0L	.43L	R-6914
R-6915	18	.40	2.0	.9	1.2	.67	61	.2	3.0L	.40L	R-6915
R-6916	12	.30	2.6	7.2	1.7	.54L	85	.3	3.0L	.77L	R-6916
R-6934	13L	.30	1.5	1.3	.80	.04	25	.3L	3.0L	.06L	R-6934
R-6935	15L	.30	1.7	4.4	.80	.14	54	.1	3.0L	.10L	R-6935
R-6936	43	.90	7.4	4.6	3.3	1.5L	55	.5	6.0	2.2L	R-6936
R-6937	29L	1.4L	2.3	4.3	1.7	.55L	110	.3	3.0L	.79L	R-6937
R-6938	28L	.80	1.9	2.3	1.0	.75L	42	.2	3.0L	1.1L	R-6938
R-6939	40L	.40	2.5	1.0	.90	.41L	49	.2	3.0L	1.2	R-6939
R-6940	57L	.70	5.3	2.7	2.7	2.4	90	.4	3.0	1.7L	R-6940
R-7068	50L	.80	1.7	3.2	1.0	.13L	96	.6L	3.0	.19L	R-7068
R-7070	18L	.30	2.0	2.6	.70	.11L	37	.1	3.0L	1.9	R-7070
R-7071	15L	2.0	2.6	4.2	1.2	.24	61	.2	3.0L	.14L	R-7071
R-7072	19	1.0	4.4	2.0	2.5	.21	100	.5	3.0L	.32L	R-7072
R-7073	24L	.80	5.5	2.4	2.5	.28	93	.4	3.0L	.28L	R-7073
R-7160	24L	.60	1.1	2.8	.30	.05L	74	.3L	3.0L	.07L	R-7160
R-7168	33L	.40	2.3	2.4	1.0	.07L	80	.2	3.0L	.95	R-7168
R-7169	32L	.70	3.5	1.5	1.4	.24	47	.2	3.0L	.18L	R-7169
R-7171	60L	.90	1.3	1.4	.70	.09L	140L	.2L	3.0L	.13L	R-7171
R-7174	40L	.50	2.5	3.1	1.4	.11L	150	.3	4.0L	.17L	R-7174
R-7175	40L	.60	1.9	.9	1.1	2.4	210	.2	4.0L	.20	R-7175

Table 5e.--Major, minor, and trace element composition of 71 bituminous coal samples from Wise County, Virginia reported on whole-coal basis--continued

Sample number	Tm-S (ppm)	U (ppm)	V-S (ppm)	Y-S (ppm)	Yb (ppm)	Zn (ppm)	Zr-S (ppm)	Sample number
R-6860	0.31L	1.2	13	5.6	0.6	4.8	12	R-6860
R-6868	.55L	1.0	20	8.3	.6	7.8	19	R-6868
R-6871	.54L	2.2	19	4.8	1.0	13	11	R-6871
R-6872	.76L	1.8	20	6.0	.9	4.4	27	R-6872
R-6908	.42L	1.9	18	4.5	.9	7.4	7.6	R-6908
R-6909	.32L	2.4	6.4	3.1	.9	7.7	6.3	R-6909
R-6910	.13L	.90	4.3	2.8	.3	2.3	8.8	R-6910
R-6911	.39L	.80	16	3.0	.4	10	7.0	R-6911
R-6912	.26L	1.2	12	5.6	.5	5.6	15	R-6912
R-6913	.30L	1.4	6.5	4.9	.9	4.1	5.4	R-6913
R-6914	.71L	2.1	20	5.8	.8	31	14	R-6914
R-6915	.67L	3.3	16	6.0	.6	12	15	R-6915
R-6916	.39L	1.6	11	2.9	.7	9.2	6.2	R-6916
R-6934	.11L	1.0	4.2	2.3	.5	5.7	1.4	R-6934
R-6935	.17L	1.4	5.1	3.2	.5	3.7	9.2	R-6935
R-6936	1.1L	2.9	44	14	1.6	14	35	R-6936
R-6937	.40L	1.2	7.4	2.9	.8	58	8.7	R-6937
R-6938	.54L	1.9	12	5.0	.5	32	21	R-6938
R-6939	.29L	1.0	7.5	3.8	.7	6.4	11	R-6939
R-6940	.87L	1.7	33	10	1.3	19	23	R-6940
R-7068	.32L	.70	9.6	3.6	.4	5.1	12	R-7068
R-7070	.27L	1.4	9.2	2.8	.4	4.6	8.1	R-7070
R-7071	.24L	1.6	11	5.6	.7	12	11	R-7071
R-7072	.53L	1.6	17	9.8	1.4	30	13	R-7072
R-7073	.47L	1.8	20	5.6	1.2	14	6.0	R-7073
R-7160	.12L	.20	2.8	1.9	.3	1.7	2.8	R-7160
R-7168	.18L	.20	7.4	3.9	.5	9.1	7.4	R-7168
R-7169	.31L	.60	27	9.2	1.1	20	7.9	R-7169
R-7171	.22L	.40L	4.3	3.2	.4	3.3	6.9	R-7171
R-7174	.28L	1.1	11	7.8	.8	9.0	18	R-7174
R-7175	.25L	.70	12	5.4	.5	6.9	20	R-7175

Table 6. Statistical summary for 134 bituminous coal samples from Virginia.

data values used	mean	std dev	xmin	xmax	range	geo mean	geo dev	sigma	zero	qual
usgsash 134	10.00	7.93	1.900	51.80	49.90	7.82	1.99	7.96	0	0
statistics for following data items on ash basis										
sio2	44.57	10.53	13.000	71.00	58.00	43.08	1.32	10.57	0	3
al2o3	24.04	5.51	8.000	36.00	28.00	23.31	1.30	5.53	0	3
cao	3.14	3.66	0.210	20.00	19.79	2.04	2.40	3.67	0	3
mgo	1.00	0.46	0.230	2.99	2.76	0.90	1.60	0.46	0	0
na2o	0.67	0.51	0.170	2.76	2.59	0.53	1.95	0.51	0	0
k2o	2.20	1.12	0.380	5.40	5.02	1.91	1.75	1.13	0	3
fe2o3	14.47	12.80	2.300	57.00	54.70	10.36	2.23	12.85	0	3
mno	0.03	0.03	0.010	0.23	0.22	0.03	2.09	0.03	1	1
tio2	1.26	0.45	0.300	2.60	2.30	1.17	1.47	0.45	0	3
p2o5	0.29	0.50	0.020	3.50	3.48	0.14	2.97	0.50	0	3
so3	3.72	3.16	0.300	16.00	15.70	2.67	2.32	3.17	0	4
cl	42.84	43.98	6.880	174.51	167.63	26.48	2.67	45.33	0	117

statistics for following data items on whole-coal basis

ag	120	0.03	0.006	0.20	0.19	0.03	1.82	0.02	0	14
as	134	18.85	29.18	166.00	165.00	8.05	3.62	29.29	0	0
there were less than two positive-valued items for au										
b	130	13.81	8.83	48.09	46.41	11.44	1.88	8.86	0	4
ba	134	88.55	60.20	310.80	295.80	70.85	1.98	60.43	0	0
be	134	2.11	1.51	10.65	10.27	1.75	1.83	1.52	0	0
there were less than two positive-valued items for bi										
br	134	1.33	2.04	10.48	10.46	0.53	4.08	2.05	0	0
cd	134	0.11	0.35	4.09	4.09	0.06	2.34	0.35	0	0
ce	134	17.34	13.05	88.00	86.00	13.91	1.94	13.10	0	0
co	134	7.04	3.89	20.50	19.30	5.96	1.82	3.90	0	0
cr	133	13.34	10.71	2.800	63.80	10.54	1.94	10.75	0	1
cs	131	0.98	1.04	5.80	5.78	0.61	2.69	1.04	0	3
cu	134	17.30	8.47	70.29	64.35	15.73	1.53	8.51	0	0
dy	19	1.70	0.79	3.48	2.78	1.53	1.61	0.81	0	115
er	43	0.96	0.53	2.75	2.43	0.85	1.66	0.53	0	91
eu	134	0.32	0.19	1.34	1.26	0.27	1.71	0.19	0	0
f	123	148.00	279.96	2100.00	2080.00	82.57	2.48	281.11	0	11
ga	134	4.32	3.09	17.09	16.47	3.52	1.87	3.11	0	0
gd	103	1.29	0.91	5.70	5.36	1.07	1.81	0.92	0	31
ge	104	1.93	2.19	12.57	12.45	1.20	2.68	2.21	0	30
hf	131	0.76	0.72	5.00	4.90	0.58	2.04	0.72	0	3
hg	121	0.11	0.10	0.80	0.79	0.07	2.59	0.10	0	13
ho	5	0.46	0.15	0.70	0.48	0.43	1.46	0.17	0	129
there were less than two positive-valued items for in										
there were less than two positive-valued items for ir										
la	134	9.54	7.55	47.00	46.00	7.47	2.02	7.57	0	0
li	134	17.67	22.66	181.30	180.41	10.74	2.70	22.75	0	0
lu	133	0.15	0.08	0.60	0.50	0.13	1.51	0.08	0	1
mn	134	22.74	26.67	213.20	212.45	14.38	2.59	26.77	0	0
mo	128	1.68	1.29	11.77	11.46	1.38	1.84	1.29	0	6
nb	132	1.94	2.05	11.91	11.75	1.30	2.42	2.06	0	2
nd	103	9.11	7.35	43.51	42.50	7.04	2.05	7.38	0	31
ni	134	10.73	6.35	39.12	36.60	9.20	1.74	6.38	0	0

Table 6. Virginia statistical summary--continued.

data item	values used	mean	std dev	xmin	xmax	range	geo mean	geo dev	sigma	zero	qual
there were less than two positive-valued items for os											
pb	133	6.00	6.53	0.091	61.20	61.11	4.21	2.36	6.56	0	1
there were less than two positive-valued items for pd											
there were less than two positive-valued items for pr											
there were less than two positive-valued items for pt											
rb	51	27.51	19.26	7.000	77.00	70.00	22.25	1.90	19.45	0	83
there were less than two positive-valued items for re											
there were less than two positive-valued items for rh											
there were less than two positive-valued items for ru											
sb	131	1.01	1.67	0.150	18.90	18.75	0.74	2.00	1.67	0	3
sc	134	3.14	2.13	0.800	14.40	13.60	2.67	1.73	2.14	0	0
se	133	2.89	1.51	0.800	7.62	6.82	2.55	1.65	1.51	0	1
sm	134	1.60	1.03	0.300	6.90	6.60	1.35	1.80	1.04	0	0
sn	51	1.28	2.02	0.042	14.28	14.24	0.76	2.71	2.04	0	83
sr	133	102.96	79.30	20.580	579.60	559.02	82.12	1.93	79.60	0	1
there were less than two positive-valued items for ta											
tb	118	0.28	0.16	0.100	1.10	1.00	0.24	1.68	0.16	0	16
there were less than two positive-valued items for te											
th	39	5.62	2.97	3.000	14.00	11.00	5.02	1.57	3.01	0	95
t1	26	1.43	1.08	0.196	3.95	3.75	1.02	2.46	1.10	0	108
there were less than two positive-valued items for tm											
u	133	1.61	0.97	0.200	5.60	5.40	1.34	1.91	0.97	0	1
v	134	16.86	13.47	2.760	84.76	82.00	13.04	2.03	13.52	0	0
there were less than two positive-valued items for w											
y	134	6.86	4.77	1.785	31.08	29.29	5.71	1.80	4.78	0	0
yb	134	0.83	0.48	0.200	3.60	3.40	0.72	1.65	0.48	0	0
zn	134	13.87	15.46	1.530	93.84	92.31	8.81	2.51	15.52	0	0
zr	134	17.87	21.37	1.407	132.00	130.59	11.34	2.53	21.45	0	0
statistics for following data items on 'as received' basis											
data item	values used	mean	std dev	xmin	xmax	range	geo mean	geo dev	sigma	zero	qual
btu	134	13378.87	1289.01	7121.000	15038.00	7917.00	13304.73	1.12	1293.85	0	0
ashdef	115	2349.17	254.68	1925.000	2910.00	985.00	2335.40	1.11	255.80	0	19
ashsof	108	2428.84	237.04	2015.000	2910.00	895.00	2417.28	1.10	238.14	0	26
ashfld	99	2504.19	220.51	2125.000	2910.00	785.00	2494.48	1.09	221.63	0	35
freswel	131	7.89	1.82	1.000	9.00	8.00	7.51	1.46	1.83	0	3
mo1stur	134	2.97	1.40	0.800	11.00	10.20	2.70	1.55	1.40	0	0
volmat	134	30.33	4.58	15.300	39.50	24.20	29.93	1.19	4.59	0	0
fixedc	134	56.84	6.03	32.700	76.00	43.30	56.49	1.12	6.05	0	0
bmath	134	9.93	7.78	1.900	48.60	46.70	7.80	1.98	7.81	0	0
hydrogn	134	5.11	0.50	2.800	6.00	3.20	5.08	1.11	0.50	0	0
carbon	134	75.01	6.99	41.800	83.80	42.00	74.62	1.11	7.01	0	0
nitrogn	134	1.40	0.20	0.800	1.80	1.00	1.39	1.17	0.20	0	0
oxygen	134	7.40	1.72	2.900	16.60	13.70	7.20	1.27	1.73	0	0
sulfur	134	1.22	0.92	0.400	5.20	4.80	1.01	1.77	0.93	0	0
sulfate	113	0.04	0.05	0.010	0.31	0.30	0.02	2.29	0.05	21	0
sulfpyr	129	0.57	0.76	0.020	4.20	4.18	0.28	3.37	0.76	5	0
sulforg	133	0.64	0.25	0.030	2.05	2.02	0.59	1.55	0.25	1	0
adloss	91	1.63	1.07	0.100	5.80	5.70	1.31	2.01	1.07	0	43

Table 7. Statistical summary for 55 bituminous coal samples from Tennessee.

data item	values used	mean	std dev	xmin	xmax	range	geo mean	geo dev	sigma	zero	qual
usgsash	55	8.05	5.99	1.400	32.30	30.90	6.25	2.06	6.05	0	0
statistics for following data items on ash basis											
stc2	50	39.55	11.68	17.000	69.00	52.00	37.66	1.38	11.79	0	5
al2o3	50	23.86	5.90	12.000	48.00	36.00	23.14	1.28	5.96	0	5
cao	49	2.98	2.33	0.370	14.00	13.63	2.36	1.96	2.36	0	6
mgO	55	0.94	0.45	0.180	2.16	1.98	0.83	1.70	0.45	0	0
na2O	55	0.35	0.24	0.130	1.81	1.68	0.30	1.61	0.24	0	0
k2O	50	1.93	0.96	0.580	4.40	3.82	1.68	1.73	0.97	0	5
fe2O3	50	18.85	13.94	3.000	56.00	53.00	14.21	2.17	14.08	0	5
mno	55	0.03	0.04	0.010	0.25	0.24	0.02	1.92	0.04	0	0
tiO2	50	1.14	0.33	0.430	2.00	1.57	1.08	1.39	0.34	0	5
p2O5	26	0.87	0.86	0.090	3.70	3.61	0.52	2.90	0.87	0	29
so3	49	4.01	3.16	0.730	12.00	11.27	3.02	2.12	3.19	0	6

there were 1c55 than two positive-valued items for ci

statistics for following data items on whole-coal basis

ag	53	0.05	0.03	0.008	0.19	0.18	0.04	1.84	0.03	0	2
as	53	22.42	30.27	1.000	161.00	160.00	9.35	4.00	30.56	0	2
there were less than two positive-valued items for au											
b	29	39.57	17.18	14.400	71.70	57.30	35.67	1.60	17.49	0	26
ba	55	59.35	47.61	8.100	238.96	230.86	43.29	2.26	48.05	0	0
be	55	1.44	1.02	0.483	6.85	6.36	1.22	1.71	1.02	0	0
b1	2	0.63	0.24	0.383	0.87	0.49	0.58	1.51	0.35	0	53
br	55	1.43	1.39	0.017	6.47	6.46	0.64	5.00	1.41	0	0
cd	51	0.09	0.08	0.007	0.41	0.40	0.06	2.26	0.08	0	4
ce	53	15.30	10.64	4.000	60.00	56.00	12.41	1.91	10.74	0	2
co	55	4.94	3.13	1.400	15.80	14.40	4.23	1.71	3.16	0	0
cr	55	11.83	9.46	2.000	50.00	48.00	8.98	2.10	9.55	0	0
cs	46	0.84	0.83	0.100	4.30	4.20	0.50	2.92	0.84	0	9
cu	55	16.79	15.56	1.188	99.20	98.01	13.39	1.89	15.71	0	0
dy	7	1.69	0.94	0.578	3.30	2.73	1.41	1.88	1.02	0	48
er	33	0.87	0.61	0.259	2.78	2.52	0.71	1.88	0.62	0	22
eu	54	0.26	0.15	0.090	1.02	0.93	0.23	1.59	0.15	0	1
f	48	72.29	51.14	22.000	200.00	178.00	57.47	1.95	51.69	0	7
ga	55	3.99	3.60	0.667	21.41	20.75	2.93	2.18	3.64	0	0
gd	24	0.81	0.35	0.323	1.91	1.59	0.74	1.55	0.36	0	31
ge	45	2.17	2.52	0.150	13.69	13.54	1.29	2.83	2.55	0	10
hf	55	0.61	0.43	0.100	2.20	2.10	0.49	1.98	0.44	0	0
hg	47	0.16	0.15	0.010	0.58	0.57	0.10	2.86	0.15	0	8
ho	7	0.49	0.30	0.168	1.09	0.92	0.41	1.87	0.33	0	48
in	3	0.62	0.46	0.098	1.22	1.13	0.40	2.86	0.57	0	52
there were less than two positive-valued items for ir											
la	55	8.25	6.23	2.000	37.00	35.00	6.53	1.98	6.29	0	0
li	55	16.98	24.48	0.700	148.58	147.88	8.22	3.45	24.70	0	0
lu	35	0.12	0.04	0.100	0.30	0.20	0.11	1.32	0.05	0	20
mn	55	15.18	14.76	2.760	70.30	67.54	10.49	2.31	14.90	0	0
mo	54	1.86	1.74	0.180	12.00	11.82	1.41	2.10	1.76	0	1
nb	37	1.31	1.06	0.289	5.50	5.21	1.01	2.03	1.07	0	18
nd	32	7.17	4.75	1.771	19.68	17.91	5.73	1.98	4.83	0	23
ni	55	9.55	7.58	3.220	55.56	52.34	8.00	1.74	7.65	0	0

Table 8. Kentucky statistical summary--continued.

Table with columns: data item, values used, mean, std dev, xmin, xmax, range, geo mean, geo dev, sigma, zero, qual. Includes descriptive text for each row.

statistics for following data items on 'as received' basis

Table with columns: data item, values used, mean, std dev, xmin, xmax, range, geo mean, geo dev, sigma, zero, qual. Lists statistical values for various items.

Table 10.— Comparison of analysis results of samples from Virginia to those from Tennessee, Kentucky and West Virginia, using student t-test at a 95% confidence level. Statistical data are in Tables 6-9.

ANALYSES

	SiO ₂	Al ₂ O ₃	CaO	MgO	Na ₂ O	K ₂ O	Fe ₂ O ₃	MnO	TiO ₂	P ₂ O ₅	SO ₃	Cl	Ag	As	Au	B	Ba	Be	Bi	Br	Cd	Ce	Co	
Virginia vs. Tennessee	+	0	0	0	+	+	-	0	0	-	0	-	0	-	0	-	+	+	0	0	0	0	+	
Virginia vs. Kentucky	0	0	+	+	+	-	-	0	0	0	+	-	0	-	0	-	0	-	0	0	0	0	-	0
Virginia vs. West Virginia	-	-	+	+	0	+	+	0	-	0	+	-	-	+	-	-	0	-	-	-	0	0	0	0
	Cr	Cs	Cu	Dy	Er	Eu	F	Ga	Gd	Ge	Hf	Hg	Ho	In	Ir	La	Li	Lu	Mn	Mo	Nb	Nd	Ni	
Virginia vs. Tennessee	0	0	0	0	0	+	0	0	+	0	0	-	0	-	0	0	0	+	+	0	0	0	0	
Virginia vs. Kentucky	0	0	-	-	-	0	0	-	-	0	0	0	0	-	-	0	0	0	0	-	-	-	-	
Virginia vs. West Virginia	-	0	0	-	-	0	+	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Os	Pb	Pd	Pr	Pt	Rb	Re	Rh	Ru	Sb	Sc	Se	Sm	Sn	Sr	Ta	Tb	Te	Th	Tl	Tm	U	V	
Virginia vs. Tennessee	0					0				0	0	0	-	0	+	+	0	0	0	0	0	0	0	
Virginia vs. Kentucky	-					0				-	-	-	-	0	+	0	0	0	0	0	0	-	-	
Virginia vs. West Virginia	0					+				0	0	-	0	0	0	0	0	0	0	0	-	0	0	
	W	Y	Yb	Zn	Zr	USGSash																		
Virginia vs. Tennessee	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Virginia vs. Kentucky	-	-	-	-	-	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Virginia vs. West Virginia	-	0	+	+	-	0	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
						BTU	Ashdef	Ashsof	Ashfld	Freeswel	Moisture	Volmat	FixedC	Bmash	H	C	N	O	S	Sulfate	Sulfpyr	Sulforg	Adloss	
Virginia vs. Tennessee						0	0	0	0	+	+	-	0	0	-	0	-	-	-	-	-	0	-	+
Virginia vs. Kentucky						0	0	0	0	+	+	0	0	0	0	0	0	0	0	0	0	0	0	-
Virginia vs. West Virginia						+	-	0	0	+	0	0	0	0	0	0	0	0	0	0	0	0	0	-

Explanation: Plus (+) indicates arithmetic mean of Virginia samples is greater and minus (-) indicates arithmetic mean of Virginia samples is less than mean of samples compared to Virginia samples. Blank space indicates insufficient data for statistical comparison.

