UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

# Analyses of Coal and Selected Rock Samples from the USGS 1975 Drilling Recluse Geologic Analysis Area Northern Campbell County, Wyoming

By

Robert G. Hobbs

Open-File Report 80-1161

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## Introduction

In order to assess the surface minable portion of the total coal resources in the Recluse geologic analysis area, seven holes were drilled in 1975. Drilling was done by B & B Drilling Company of Libby, Montana, under contract to the U.S. Geological Survey (USGS). About 60 percent of the drilling was cored.

This report represents the results of the various analyses performed on the cored coals and selected portions of the cored rock intervals. The description of the cores were published previously (Hobbs and others, 1977). This report is the third on the drilling in the Recluse area.

The overall objectives of the Recluse geologic analysis area project are to assess the coal resources of the area in terms of quality and quantity, relationship with coal beds in nearby areas, and suitability for surface, underground, or in-situ mining; and to assess factors relating to the siting of future mines and the reclamation potential of the mined land.

## Acknowledgments

Acknowledgments with sincere appreciation go to the following, without whose help this report could not have been accomplished: U.S. Department of Energy, Coal Analysis Section, Forrest E. Walker, Chemist in Charge, Pittsburgh, Pennsylvania; personnel of the U.S. Geological Survey, chemical analysis laboratory, under the direction of Irving May and Claude Huffman, Jr.; the drilling contractor, William Lake, owner and operator of B & B Drilling, Libby, Montana; and David Illiff and Martin Lake, driller helpers. I also acknowledge the assistance of the following USGS personnel: D. G. Malotte, J. D. Sanchez and J. F. Windolph, Jr., whose assistance at the drill site was invaluable; M. Carter and A. Medlin; R. N. Babcock, G. B. Schneider, and V. Swanson and their group; J. Hatch, T. Carter, R. Hildebrand, R. J. Smith, and S. D. Woodruff.

## Location

The Recluse model area is located about 40 miles north of Gillette, Campbell County, Wyoming. It includes all of the following USGS 1:24,000 scale topographic and corresponding geologic maps: Homestead Draw SW, Pitch Draw, Recluse, and White Tail Butte. The area includes all of Tps. 55 and 56 N., R. 73 W., and parts of Tps. 54, 55, and 56 N., R. 72 W.; T. 54 N., R. 73 W.; and Tps. 54, 55, and 56 N., R. 74 W. The western portion of the model area is in the Spotted Horse coal field (Olive, 1957) and the balance is in the Little Powder River coal field (Davis, 1912).

## Geology

Most of the surface rocks within the Recluse model area belong to the Paleocene Tongue River Member of the Fort Union Formation. Also present are scattered outliers of the overlying Eocene Wasatch Formation (as presently defined). The regional dip is at a very low angle to the west.

The Tongue River Member consists primarily of interbedded mudstones, sandstones, and thick coal beds. In the area drilled, eight regionally correlative coal beds are present. These are, in ascending order:

Smith

Anderson

Canyon A
Canyon B (where split into 2 coal beds)

Canyon (where present as one coal bed)

Cook

Unnamed bed (formerly called Lower Cook or Upper Wall)

Wall

Pawnee

Upper Pawnee
Lower Pawnee (where split)
Cache

The Anderson through the Cook coal beds were penetrated in each hole; however, not all were cored (see table 1).

## Drilling

Seven holes, ranging in depth from 401 to 509 ft, were drilled and partially cored. (See table 1, and Hobbs and others, 1977, for detailed descriptions of core.)

The drilling was done using air, with water or water/foam injection when required. All water used was from the same source and the only drilling fluid additive used was a biodegradable liquid foaming agent. There is no evidence that the drilling water and (or) additive may have contaminated the core and affected the subsequent analytical values.

## Sample analysis

### General

The U.S. Bureau of Mines (USBM) analyzed coal only for proximate, ultimate, Btu/lb, forms of sulfur, and fusibility of ash. The U.S. Geological Survey chemically analysized coal and rock for the following: content of seven trace elements in whole coal; major and minor oxide and trace-element composition of the laboratory ash of coal beds; and major and minor oxide and trace-element composition reported on whole coal basis.

For a description of the rock lithologies and coal see Hobbs, and others, (1977). Table 2 shows the average distribution of selected elements in the Earth's crust (Turekian and Wedepohl, 1961; Taylor, 1964) and may be used for comparison with applicable data shown in this report.

The rock samples selected for analysis were considered representative of a given rock unit. The depth interval of the rock samples, as well as the depth interval of the rock unit it represents including pertinent remarks, are shown on table 3. The analytical data are shown on tables 6a to 6c and represent analyses of overburden, roof and floor rock, and some interburden.

The chemical composition of the rocks compare favorably, with some exceptions, with the data shown on table 2. These exceptions, however, are not in the concentration ranges that would require selective overburden placement upon mining.

The chemical analyses (USGS) of the coal samples are shown on tables 6 through 9, and 11 through 13. For a discussion of and comparison with other coal analyses of the region and the United States see Swanson and others (1976). The chemical composition of the coal compares, with some exceptions, favorably with the data in table 2. The values that are exceptions do not indicate a concentration that would be environmentally deleterious.

The amount of major oxides present as well as their ratio to each other are important to the individual coal user, especially for boiler design. The trace-element composition, as well as some of the other elements such as sulfur, show a higher concentration in the roof and floor coals. This should be expected as these are generally the areas of higher ash content (clays and muds) relative to the overall coal bed (see tables 6, 7, and 10 through 14).

The USBM analyzed a rock interval, 360.2 to 361.8 feet, separately (table 10f), but the weighted average analysis of the whole bed (table 14) included this parting to show the effect of not removing the parting after mining. The effect of removing the parting from the coal bed can be calculated from the data in table 10f.

The analyses done by the USBM are given in tables 10a to 10h; the weighted average values by coal bed and drill hole are given in Table 14. For comparison with other coals see Swanson and others (1976).

Moisture content can vary considerably, even in samples of the same coal, depending on how the coal is handled prior to analysis. In order to have the as-received analysis be more meaningful relative to other samples and other coal beds, a standardized sampling procedure was followed so that the coal would not become dry. After placing the samples in a 0.006 inch (6 mil) polyethylene bag, enough moisture was added to maintain 100 percent relative

humidity. After as much air as possible was forced out of the bag, it was tightly sealed and placed in a second bag which was also sealed. The as-received moisture contents show a good correlation with each other. The range of moisture contents of individual coal-beds among drill holes is considered low: 4.1 percent for the Anderson coal bed, 1.2 percent for the Canyon A coal bed, 0.6 percent for the Canyon B coal bed, and 2.5 percent for the Canyon coal bed. These data are shown on table 4.

These moisture values are not equilibrium moisture values and are probably slightly higher than equilibrium values. Equilibrium moisture determinations were not made of the 1975 samples; however, limited determinations--two samples each of the Anderson Canyon A and Canyon B coal beds--made from cores acquired from the 1976 drilling in the immediate area show these equilibrium moisture values:

| | | | Average |
|---|---|---|---|
| Anderson | No. 1 | 30.48 percent | |
| | No. 2 | 29.01 percent | 29.75 |
| Canyon A | No. 1 | 27.44 percent | |
| | No. 2 | 31.19 percent | 29.32 |
| Canyon B | No. 1 | 30.89 percent | |
| | No. 2 | 28.86 percent | 29.88 |

Assuming these equilibrium moisture values are representative, they are less than the as-received weighted average moisture contents by the following, all of which are significant for apparent rank determination: Anderson, 2.9 percent; Canyon, 3.8 percent; and Canyon B, 4.6 percent. The low heat value of the coal relative to bituminous coal is due to its lesser degree of maturation of the coal; that is, it is lower in rank. Moisture content is a major factor, but sulfur is not, because there is so little of it.

## Sulfur content

The total sulfur content and the ratio of inorganic to organic sulfur increases generally are higher in the floor and roof coals (tables 10 through 14). The overall sulfur content on a total bed basis ranges from 0.2 to 0.6 percent, as-received (table 14). The average total sulfur is 0.4 percent. For the most part, the inorganic (sulfate and pyritic) forms are a minor portion of the total sulfur content, about 16 percent, which equals 0.064 percent of the total coal. Sulfate sulfur form is about 27 percent of the total inorganic sulfur. This is not excessive and probably indicates a slight weathering effect caused by circulating ground water.

## Classification of coals by rank

Determination of the moist, mineral-matter-free heating value, which allows calculation of apparent rank requires equilibrium moisture values for the samples analyzed. As previously noted, these moisture determinations were not made. However, using the equilibrium moisture data from the 1976 drilling, together with the weighted average as-received Btu/lb values, an apparent rank was calculated for coal beds from the 1975 drilling (table 5). This calculation is in accordance with American Society of Testing and

Materials (1972) D388-66 standard, section 7.2, Parr formula 3, p. 56. This apparent rank determination is qualified because equilibrium moisture data from other drill holes were used, but it is considered to be a good approximation. These data are shown on table 5. Classification of these coals according to table 1 American Society of Testing and Materials (1972) shows that these coals range in rank from lignite "A" to subbituminous "C". The range in heating values on a moist, mineral matter-free basis is low -- 8064 Btu/lb to 8526 Btu/lb. This may indicate that the zone of southward transition from the lignites to subbituminous coals in Powder River Basin and Great Plains occurs in this area. Coals of the Recluse Area can be considered to be predominantly subbituminous "C" rank.

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Table 1.--Recluse Model Area 1975 USGS Drill Holes

[Location coal and rock intervals cored.
Measurements in feet. Rock cored 1,299.7;
Coal cored 507.0; Total cored 1,806.7;
Rotary drilled 1,303.3; Total footage 3,110.0]

| Hole no. | Location | Surface elevation (feet) | Coals cored | | Rock Intervals cored (feet) | Total depth (feet) |
|---|---|---|---|---|---|---|
| | | | Bed name | Intervals (feet) | | |
| RM-1 | SE 1/4 SW 1/4 NW 1/4, sec. 33 | 4190 | Anderson | 148.2-185.4 | 83.0-148.2 | 402 |
| | T. 56 N., R. 72 W. | | | | 185.4-187.8 | |
| | | | Canyon A | 187.8-210.3 | 210.3-222.0 | |
| RM-2 | SW 1/4 NE 1/4, sec. 32 | 4238 | Anderson | 198.4-232.6 | 20.0-198.4 | 465 |
| | T. 56 N., R. 72 W. | | Canyon A | 236.5-265.2 | 232.6-236.5 | |
| | | | Canyon B | 311.2-330.6 | 265.2-311.2 | |
| | | | | | 330.6-343.0 | |
| RM-3 | NE 1/4 NW 1/4 NW 1/4, sec. 25 | 4195 | Anderson | 92.5-123.9 | 20.0- 92.5 | 442 |
| | T. 56 N., R. 73 W. | | | | 124.5-153.0 | |
| RM-4 | NE 1/4 SW 1/4 SW 1/4, sec. 25 | 4145 | Anderson | 129.4-167.0 | 23.0-129.4 | 422 |
| | T. 56 N., R. 73 W. | | Canyon A | 298.0-320.5 | 167.0-298.0 | |
| | | | Canyon B | 323.0-349.0 | 320.5-323.0 | |
| | | | | | 349.0-358.0 | |
| RM-5 | SW 1/4 SE 1/4 SE 1/4, sec. 27 | 4186 | Anderson | 135.2-169.2 | 130.0-135.2 | 509 |
| | T. 56 N., R. 73 W. | | Canyon | 354.5-395.5 | 169.2-273.0 | |
| | | | | | 340.0-354.5 | |
| | | | | | 395.5-406.0 | |
| RM-6 | NW 1/4 NE 1/4, sec. 21 | 4106 | Anderson | 88.9-120.0 | 20.0- 88.9 | 405 |
| | T. 56 N., R. 73 W. | | Canyon | 265.5-306.4 | 120.0-256.5 | |
| | | | | | 306.4-325.0 | |
| RM-7 | NE 1/4 NW 1/4, sec. 26 | 4194 | Anderson | 133.2-170.3 | 20.0-133.2 | 465 |
| | T. 55 N., R. 73 W. | | Canyon | 286.2-329.6 | 170.3-286.2 | |
| | | | Cook | 370.0-382.0 | 329.6-370.0 | |
| | | | | | 382.0-383.0 | |

Table 2.--Average distribution of selected elements in the earth's crust

["X" indicates that only order of magnitude estimates could be made]

| | Sandstone[1] | Shale[1] | Crustal[2] |
|---|---|---|---|
| | In percent | | |
| Si | 36.8 | 7.3 | 28.15 |
| Al | 2.5 | 8.0 | 8.23 |
| Ca | 3.9 | 2.21 | 4.15 |
| Mg | .7 | 1.5 | 2.33 |
| Na | .33 | .96 | 2.36 |
| K | 10.7 | 2.66 | 2.09 |
| Fe | .98 | 4.72 | 5.63 |
| Ti | .15 | .46 | .57 |
| | Parts per million (ppm) | | |
| As | 1 | 13 | 1.8 |
| Cd | .X | .3 | .2 |
| Cu | X | 45 | 55 |
| F | 270 | 740 | 625 |
| Hg | .03 | .4 | .08 |
| Li | 15 | 66 | 20 |
| Pb | 7 | 20 | 12.5 |
| Sb | .0X | 1.5 | .2 |
| Se | .05 | .6 | .05 |
| Th | 1.7 | 12 | 9.6 |
| U | .45 | 3.7 | 2.7 |
| Zn | 16 | 95 | 70 |
| B | 35 | 100 | 10 |
| Ba | X0 | 580 | 425 |
| Be | .X | 3 | 2.8 |
| Co | .3 | 19 | 25 |
| Cr | 35 | 90 | 100 |
| Ga | 12 | 19 | 15 |
| Mo | .2 | 2.6 | 1.5 |
| Ni | 2 | 68 | 75 |
| Sc | 1 | 13 | 22 |
| Sr | 20 | 300 | 375 |
| V | 20 | 130 | 135 |
| Y | 40 | 26 | 33 |
| Yb | 4 | 2.6 | 3 |
| Zr | 220 | 160 | 165 |

[1]Turekian and Wedepohl, 1961.
[2]Taylor, 1964

Table 3.--Rock core sample interval and rock interval represented in USGS Drill holes RM-1, 3, and 4

| Hole no. | Sample no. | Rock sample interval (feet) | Rock interval represented (feet) | Remarks |
|---|---|---|---|---|
| RM 1 | D176272 | 83.0- 97.3 | 61.0- 97.3 | Core point--80.0; 61.0 to 80.0 projected on sample and natural gamma log interpretation. |
| | D176273 | 98.3- 99.2 | 97.3-101.2 | Roof rock--Anderson rider coal bed. |
| | D176274 | 101.2-101.9 | 101.2-102.3 | Roof rock--Anderson rider coal bed. |
| | D176275 | 107.3-107.9 | 107.3-107.9 | Parting--Anderson rider coal bed. |
| | D176276 | 108.4-112.6 | 108.4-112.6 | Floor rock--Anderson rider coal bed. |
| | D176277 | 118.6-122.0 | 112.6-134.6 | |
| | D176278 | 136.5-139.5 | 134.6-141.7 | Roof rock--Anderson coal bed. |
| | D176279 | 143.9-147.4 | 141.7-148.2 | Roof rock--Anderson coal bed. |
| | D176280 | 210.3-217.7 | 210.3-217.7 | Floor rock--Canyon A coal bed. |
| | D176281 | 217.7-222.0 | 217.7-226.0 | End coring 222.0 to 226.0 from natural gamma log. |
| RM 3 | D176532 | 63.0- 63.5 | 61.8- 63.5 | |
| | D176533 | 72.0- 72.5 | 68.0- 73.0 | Roof rock--Anderson rider coal bed. |
| | D176534 | 86.0- 90.0 | 81.7- 92.5 | Roof rock--Anderson coal bed. |
| | D176535 | 124.5-130.5 | 124.5-130.5 | Floor rock--Anderson coal bed. |
| | D176536 | 131.1-132.6 | 130.5-133.7 | |
| | D176537 | 134.4-135.1 | 133.7-139.0 | |
| RM 4 | D176517 | 34.4- 35.4 | 24.0- 35.5 | |
| | D176518 | 36.1- 37.2 | 35.5- 38.8 | |
| | D176519 | 43.0- 43.9 | 43.0- 49.9 | |
| | D176520 | 50.2- 51.5 | 49.9- 53.0 | |
| | D176521 | 54.0- 55.3 | 53.0- 56.5 | |
| | D176522 | 56.9- 58.4 | 56.5- 61.9 | |
| | D176523 | 62.5- 63.0 | 61.9- 64.0 | |
| | D176524 | 76.0- 77.6 | 68.0- 81.6 | |
| | D176525 | 90.3- 93.1 | 81.6- 95.2 | |
| | D176526 | 95.6- 96.4 | 95.2- 97.5 | |
| | D176527 | 103.0-110.2 | 102.2-110.7 | Roof rock--Anderson rider coal bed. |
| | D176528 | 113.4-119.3 | 112.5-124.2 | |
| | D176529 | 118.0-118.4 | 118.0-118.4 | Siltstone streak. |
| | D176530 | 128.6-129.4 | 128.6-129.4 | Roof rock--Anderson coal bed. |
| | D176531 | 124.2-127.8 | 124.2-128.6 | Roof rock--Anderson coal bed. |

Table 4.--Comparison of coal bed proximate analysis moisture

| Hole no. | Net coal thickness (feet) | Moisture As recieved (percent) |
|---|---|---|
| | Anderson coal bed | |
| RM-1 | 36.9 | 32.0 |
| RM-2 | 34.2 | 32.1 |
| RM-3 | 31.4 | 31.3 |
| RM-4 | 36.2 | 31.3 |
| RM-5 | 33.4 | 35.4 |
| RM-6 | 31.1 | 32.0 |
| RM-7 | 37.1 | 34.5 |
| Range | 31.4-37.1 | 31.3-35.4 |
| Weighted average | 34.3 | 32.7 |
| | Canyon A coal bed | |
| RM-1 | 16.6 | 32.6 |
| RM-2 | 25.2 | 32.8 |
| RM-4 | 20.5 | 33.8 |
| Range | 16.6-25.2 | 32.6-33.8 |
| Weighted average | 20.8 | 33.1 |
| | Canyon B coal bed | |
| RM-2 | 19.4 | 34.1 |
| RM-4 | 26.0 | 34.7 |
| Range | 19.4-26.0 | 34.1-34.7 |
| Weighted average | 22.7 | 34.5 |
| | Canyon coal bed | |
| RM-5 | 40.6 | 32.2 |
| RM-6 | 35.3 | 32.0 |
| RM-7 | 41.4 | 34.5 |
| Range | 35.3-41.4 | 32.0-34.5 |
| Weighted average | 39.1 | 33.0 |
| | Cook coal bed | |
| RM-7 | 12.4 | 31.7 |

Table 5.--Average Btu/lb values of analyzed beds in the Recluse area: as received, corrected for equilibrium moisture and on a moist, mineral matter-free basis, and the apparent rank (qualified)

| Hole no. | Coal bed | Btu/lb values[1] As received (analysis) | As received, corrected for (equilibrium moisture) | Moist, mineral-matter-free[2] | Apparent rank[3] (qualified)[4] |
|---|---|---|---|---|---|
| | | | 1976 Drilling | | |
| 76-105 | Anderson | 6970 | 7800 | 8330 | Subbituminous "C" |
| | Canyon A | 6750 | 7440 | 8320 | Subbituminous "C" |
| | Canyon B | 7830 | 8050 | 8490 | Subbituminous "C" |
| | | | 1975 Drilling | | |
| RM-1 | Anderson | 7570 | 7810 | 8320 | Subbituminous "C" |
| | Canyon A | 7510 | 7880 | 8390 | Subbituminous "C" |
| RM-2 | Anderson | 7210 | 7460 | 8240 | Lignite "A" |
| | Canyon A | 6780 | 7130 | 8060 | Lignite "A" |
| | Canyon B | 7460 | 7940 | 8390 | Subbituminous "C" |
| RM-3 | Anderson | 7490 | 7660 | 8260 | Lignite "A" |
| RM-4 | Anderson | 7620 | 7780 | 8420 | Subbituminous "C" |
| | Canyon A | 7460 | 7960 | 8300 | Subbituminous "C" |
| | Canyon B | 7530 | 8090 | 8490 | Subbituminous "C" |
| RM-5 | Anderson | 7030 | 7450 | 8270 | Lignite "A" |
| | Canyon | 7030 | 7320 | 8260 | Lignite "A" |
| RM-6 | Anderson | 7390 | 7620 | 8310 | Subbituminous "C" |
| | Canyon | 7260 | 7550 | 8320 | Subbituminous "C" |
| RM-7 | Anderson | 7340 | 7860 | 8350 | Subbituminous "C" |
| | Canyon | 7570 | 8030 | 8530 | Subbituminous "C" |
| | Cook | 7000 | 7230 | 8290 | Lignite "A" |

[1]Rounded to nearest 10 Btu/lb.

[2]Calculated from ASTM (1972, section 8.2, equation 3)

[3]Based on ASTM (1972), Table 1.

[4]See text.

Table 6a.--Major and minor oxide and trace-element composition of the rock samples from USGS core hole RM-1 SW 1/4 NW 1/4 sec. 33, T. 56 N., R. 72 W., Campbell County, Wyoming

[The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element symbol means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

Anderson Overburden rock 83.0 ft. to 147.4 ft., floor 21.0.3 ft. to 222.0 ft.

| Sample | Depth (feet) | $SiO_2$ % | $Al_2O_3$ | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % | $P_2O_5$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176272 | 83.0- 97.3 | 59 | 14 | 2.0 | 2.31 | 0.34 | 2.5 | 6.2 | 0.13 | 0.66 | 0.94 L |
| D176273 | 98.3- 99.2 | 59 | 13 | 1.4 | 1.77 | .36 | 2.2 | 8.0 | .16 | .64 | .92 L |
| D176274 | 101.2-101.9 | 6.2 | 1.8 | 1.5 | .45 | .20 | .22 | 2.4 | .013 | .096 | .17 L |
| D176275 | 107.3-107.9 | 73 | 10 | .38 | .72 | .42 | 2.1 | 2.1 | .008 | .50 | .94 L |
| D176276 | 108.4-112.6 | 69 | 13 | .63 | 1.25 | .26 | 2.5 | 3.8 | .030 | .73 | .95 L |
| D176277 | 118.6-122.0 | 66 | 12 | .69 | 1.17 | .24 | 2.3 | 6.4 | .16 | .71 | .92 L |
| D176278 | 136.5-139.5 | 59 | 13 | 1.2 | 1.62 | .23 | 2.1 | 5.7 | .11 | .68 | .89 L |
| D176279 | 143.9-147.4 | 51 | 11 | .74 | 1.03 | .18 | 1.8 | 6.8 | .17 | .62 | .80 L |
| D176280 | 210.3-217.7 | 73 | 9.3 | .54 | .77 | .16 | .69 | 1.9 | .018 | .15 | .92 L |
| D176281 | 217.7-222.0 | 70 | 15 | .20 | .70 | .16 | 2.0 | 2.8 | .046 | .73 | .93 L |

| Sample | Cl % | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb pmm | Se ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D176272 | 0.19 L | 10 | 0.9L | 33 | 745 | 0.12 | 32 | 24 L | 1.0 | 0.9 |
| D176273 | .18 L | 10 | .9L | 30 | 640 | .08 | 29 | 23 L | 1.0 | 1.6 |
| D176274 | .034L | 20 | .2L | 9 | 70 | .21 | 3 | 4 L | 1.0 | 1.1 |
| D176275 | .19 L | 10 | .9L | 22 | 485 | .10 | 17 | 24 L | .3 | 1.0 |
| D176276 | .19 L | 5 | 1.0L | 25 | 710 | .10 | 28 | 24 L | .4 | .8 |
| D176277 | .18 L | 8 | .9L | 27 | 565 | .11 | 30 | 23 L | .5 | 1.0 |
| D176278 | .18 L | 8 | .9L | 32 | 640 | .09 | 29 | 22 L | .5 | 1.7 |
| D176279 | .16 L | 15 | .8L | 74 | 470 | .16 | 27 | 20 L | .8 | 1.8 |
| D176280 | .18 L | 4 | .9L | 19 | 415 | .11 | 30 | 23 L | .6 | 1.0 |
| D176281 | .19 L | 5 | .9L | 19 L | 435 | .04 | 23 | 23 L | .5 | .6 |

Table 6a.--Major and minor oxide and trace-element composition of the rock samples from USGS core hole RM-1 SW 1/4 NW 1/4 Sec. 33, T. 56 N., R. 72 W., Campbell County, Wyoming--Continued

| Sample | Th ppm | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Ce ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D176272 | 12.7 | 3.8 | 113 | 70 | 700 | 3 | 500 L | 15 | 70 | 30 |
| D176273 | 14.3 | 4.4 | 106 | 70 | 700 | N | N | 15 | 70 | 30 |
| D176274 | 3.0L | 1.9 | 24 | 100 | 300 | 1.5 | 100 L | 5 | 10 | 5 |
| D176275 | 16.6 | 3.3 | 100 | 70 | 500 | N | 500 L | 10 | 30 | 15 |
| D176276 | 17.2 | 3.8 | 112 | 70 | 700 | N | 500 L | 15 | 70 | 30 |
| D176277 | 13.0 | 4.1 | 115 | 70 | 700 | N | 500 L | 15 | 70 | 20 |
| D176278 | 11.7 | 3.5 | 115 | 70 | 700 | N | 500 L | 15 | 70 | 30 |
| D176279 | 20.8 | 4.9 | 102 | 50 | 500 | N | 500 L | 10 | 50 | 15 |
| D176280 | 17.9 | 5.8 | 125 | 70 | 500 | N | 500 L | 15 | 70 | 30 |
| D176281 | 19.0 | 5.0 | 100 | 70 | 300 | N | N | 10 | 70 | 15 |

| Sample | Ge ppm-S | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D176272 | N | 100 L | N | 20 | N | 50 | 15 | 150 | 150 | 50 |
| D176273 | N | 100 L | N | 20 | 150 L | 50 | 15 | 150 | 150 | 30 |
| D176274 | 10 | 15 | 1 | 3 | 20 L | 10 | 3 | 300 | 20 | 10 |
| D176275 | N | N | N | 20 L | B | 30 | 10 L | 150 | 70 | 30 |
| D176276 | N | 100 L | N | 20 | N | 50 | 15 | 150 | 70 | 50 |
| D176277 | N | 100 L | N | 20 | N | 30 | 15 | 150 | 150 | 50 |
| D176278 | N | 100 L | N | 15 | 150 L | 50 | 15 | 150 | 150 | 50 |
| D176279 | N | 70 L | N | 15 | 100 L | 50 | 10 | 100 | 100 | 50 |
| D176280 | | 100 L | N | 30 | N | 30 | 15 | 100 | 150 | 30 |
| D176281 | | N | N | 20 | N | 30 | 10 | 70 | 70 | 30 |

| Sample | Yb ppm-S | Zr ppm-S | Total C% | Orgnc C% | Crbnt C% | Total S% |
|---|---|---|---|---|---|---|
| D176272 | 3 | 150 | 2.47 | 1.6 | 0.82 | 0.15 |
| D176273 | 3 | 150 | 4.62 | 3.6 | .48 | .24 |
| D176274 | 1 | 20 | 56.2 | 56 | .12 | 1.77 |
| D176275 | 2 | 150 | 5.10 | 5.1 | .02 | .16 |
| D176276 | 3 | 200 | 3.00 | 2.9 | .11 | .12 |
| D176277 | 3 | 200 | 2.37 | 1.8 | .56 | .15 |
| D176278 | 5 | 150 | 4.57 | 4.1 | .48 | .36 |
| D176279 | 5 | 100 | 1.05 | 9.8 | .67 | .37 |
| D176280 | 3 | 150 | 2.13 | 2.0 | .11 | .06 |
| D176281 | 3 | 200 | 1.63 | 1.3 | .34 | .10 |

Table 6b.--Major and minor oxide and trace-element composition of the rock samples from USGS core hole RM-3, NW 1/4 NW 1/4 sec. 25, T. 56 N., R. 73 W., Campbell County, Wyoming

[The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

Anderson Overburden rock 63.0 to 90.0 ft., floor 124.5 to 135.1 ft.

| Sample | Depth (feet) | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % | $P_2O_5$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176532 | 63.0- 63.5 | 40 | 5.3 | 33 | 0.93 | 0.48 | 1.2 | 2.1 | 0.058 | 0.22 | 0.16 |
| D176533 | 72.0- 72.5 | 66 | 12 | .97 | 1.23 | .39 | 2.2 | 5.2 | .065 | .56 | .095L |
| D176534 | 86.0- 90.0 | 53 | 16 | 1.3 | 1.72 | .18 | 2.4 | 5.8 | .12 | .62 | .11 |
| D176535 | 124.5-130.5 | 64 | 21 | .29 | .89 | .24 | 2.0 | 2.2 | .007 | .72 | .094L |
| D176536 | 131.1-132.6 | 63 | 17 | .36 | .88 | .23 | 2.1 | 5.4 | .017 | .71 | .093L |
| D176537 | 134.4-135.1 | 23 | 7.0 | 3.8 | 2.82 | .14 | .86 | 38 | .21 | .29 | .57 |

| Sample | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm | Th ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D176532 | 2 | 1.0L | 20 L | 330 | 0.03 | 20 L | 25 L | 0.4 | 0.4 | 8.9 |
| D176533 | 5 | 1.0L | 22 | 670 | .06 | 26 | 24 L | .7 | .6 | 16.0 |
| D176534 | 12 | .9L | 48 | 785 | .12 | 37 | 21 | 1.0 | 1.4 | 17.5 |
| D176535 | 8 | .9L | 32 | 595 | .14 | 62 | 28 | 1.0 | 1.1 | 29.7 |
| D176536 | 8 | .9L | 25 | 635 | .08 | 43 | 23 | .9 | 1.0 | 21.6 |
| D176537 | 8 | .8L | 16 L | 885 | .05 | 24 | 20 | .9 | .6 | 13.5 |

| Sample | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Nb ppm-S | Ni ppm-S | Sc ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176532 | 1.6 | 32 | 50 L | 300 | N | 10 L | 30 | 10 | N | 15 | 10 L |
| D176533 | 4.7 | 79 | 50 | 700 | N | 15 | 70 | 15 | 20 L | 20 | 15 |
| D176534 | 4.1 | 117 | 50 | 700 | N | 15 | 20 | 15 | 15 L | 20 | 15 |
| D176535 | 5.8 | 80 | 70 | 700 | N | 10 L | 100 | 30 | 20 | 20 | 15 |
| D176536 | 4.9 | 61 | 50 | 700 | N | 10 L | 70 | 30 | 20 L | 15 | 15 |
| D176537 | 8.9 | 56 | 50 L | 500 | 5 | 7 L | 20 | B | 15 L | 15 | 10 |

| Sample | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S | Total C% | Orgnc C% | Crbnt C% | Total S% |
|---|---|---|---|---|---|---|---|---|---|
| D176532 | 70 | 50 | 20 L | 2 | 100 | 6.31 | 0.1 | 6.18 | 0.10L |
| D176533 | 100 | 100 | 30 | 5 | 200 | 1.37 | .8 | .55 | .10L |
| D176534 | 150 | 100 | 20 | 2 | 150 | 7.31 | 7.1 | .22 | .16 |
| D176535 | 150 | 200 | 20 | 3 | 150 | .74 | .7 | .02 | .10L |
| D176536 | 150 | 150 | 30 | 5 | 150 | .69 | .2 | .45 | .10L |
| D176537 | 100 | 70 | 50 | B | 100 | 6.79 | .1 | 6.69 | .10L |

Table 6c.--Major and minor oxide and trace-element composition of the rock samples from USGS core hole RM-4 NWNW sec. 25, T. 56 N., R. 73 W., Campbell County, Wyoming

[The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

Overburden interval above Anderson coal bed 34.4 to 129.4

| Sample | Depth (feet) | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % | $P_2O_5$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176517 | 34.4- 35.4 | 67 | 12 | 2.8 | 2.21 | 0.68 | 2.4 | 3.3 | 0.048 | 0.50 | 0.14 |
| D176518 | 36.1- 37.2 | 54 | 15 | 2.7 | 2.60 | .50 | 2.9 | 7.9 | .14 | .59 | .19 |
| D176519 | 43.0- 43.9 | 55 | 16 | 1.3 | 2.07 | .44 | 2.9 | 6.4 | .10 | .59 | .19 |
| D176520 | 50.2- 51.5 | 58 | 12 | 6.7 | 3.20 | .66 | 2.3 | 3.9 | .06 | .51 | .17 |
| D176521 | 54.0- 55.3 | 57 | 13 | 6.7 | 3.21 | .64 | 2.5 | 4.1 | .073 | .55 | .17 |
| D176522 | 56.9- 58.4 | 55 | 13 | 6.9 | 3.24 | .60 | 2.5 | 4.4 | .074 | .54 | .18 |
| D176523 | 62.5- 63.0 | 18 | 4.6 | 44 | 1.41 | .30 | 1.1 | 3.5 | .16 | .16 | .24 |
| D176524 | 76.0- 77.6 | 54 | 15 | 5.1 | 3.08 | .49 | 2.9 | 5.3 | .091 | .55 | .19 |
| D176525 | 90.3- 93.1 | 56 | 15 | 2.1 | 2.22 | .36 | 2.8 | 8.0 | .15 | .58 | .15 |
| D176526 | 95.6- 96.4 | 83 | 7.9 | .3 | .51 | .42 | 2.3 | 1.5 | .017 | .31 | .097L |
| D176527 | 103.0-110.2 | 50 | 12 | .97 | 1.60 | .23 | 2.2 | 7.7 | .12 | .48 | .12 |
| D176528 | 113.4-119.3 | 56 | 15 | .96 | 1.57 | .25 | 2.5 | 5.6 | .083 | .61 | .12 |
| D176529 | 118.0-118.4 | 25 | 6.9 | 3.4 | 3.26 | .14 | 1.3 | 33 .56 | .30 | .17 | |
| D176530 | 128.6-129.4 | 59 | 15 | .56 | 1.01 | .25 | 2.2 | 2.4 | .009 | .61 | .084L |
| D176531 | 124.2-127.8 | 51 | 15 | .92 | 1.34 | .23 | 2.4 | 5.1 | .11 | .59 | .085L |

| Sample | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm | Th ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D176517 | 8 | 1.0L | 27 | 515 | 0.08 | 23 | 24 L | 1.6 | 0.6 | 15.4 |
| D176518 | 15 | .9L | 38 | 385 | .09 | 33 | 24 L | 1.8 | .8 | 11.0 |
| D176519 | 100 | .9L | 42 | 1200 | .15 | 30 | 23 L | 1.5 | 1.7 | 12.1 |
| D176520 | 8 | 1.0L | 27 | 1140 | .08 | 24 | 24 L | 1.0 | .6 | 14.1 |
| D176521 | 5 | .9L | 38 | 1230 | .07 | 28 | 24 L | 1.0 | .7 | 12.4 |
| D176522 | 8 | 1.0L | 41 | 700 | .08 | 28 | 24 L | 1.1 | .7 | 13.1 |
| D176523 | 2 | 1.0L | 20 L | 245 | .05 | 10 L | 24 L | 1.7 | .3 | 3.0L |
| D176524 | 5 | 1.0L | 45 | 1200 | .07 | 28 | 24 L | 1.2 | 1.0 | 12.3 |
| D176525 | 10 | .9L | 35 | 680 | .10 | 31 | 23 L | 1.2 | .6 | 20.8 |
| D176526 | 5 | 1.5 | 19 L | 700 | .06 | 10 L | 24 L | .4 | .4 | 12.8 |
| D176527 | 5 | .9L | 29 | 475 | .07 | 28 | 23 L | .4 | .6 | 18.8 |
| D176528 | 35 | .9L | 36 | 615 | .15 | 35 | 23 L | .4 | .9 | 25.3 |
| D176529 | 10 | .8L | 20 | 440 | .08 | 16 | 20 L | .2 | .4 | 8.3 |
| D176530 | 12 | .8L | 36 | 515 | .18 | 40 | 21 L | .3 | 2.0 | 34.6 |
| D176531 | 12 | .8L | 47 | 495 | .17 | 35 | 21 L | .5 | 1.4 | 25.5 |

Table 6c.--Major and minor oxide and trace-element composition of the Rock samples from USGS core hole RM-4, NWNW sec. 25, T. 56 N., R. 73 W., Campbell County, Wyoming--Continued

| Sample | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Ce ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | La ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D176517 | 2.6 | 83 | 50 | 700 | N | N | 15 | 100 | 20 | N |
| D176518 | 3.6 | 113 | 70 | 700 | N | N | 15 | 100 | 30 | N |
| D176519 | 4.4 | 147 | 70 | 700 | N | N | 20 | 100 | 30 | 100 L |
| D176520 | 2.6 | 82 | 70 | 700 | N | N | 15 | 70 | 15 | N |
| D176521 | 2.5 | 95 | 70 | 700 | N | N | 15 | 70 | 15 | N |
| D176522 | 2.9 | 93 | 70 | 700 | N | N | 15 | 70 | 20 | N |
| D176523 | 1.0 | 39 | 50 L | 200 | N | N | 10 L | 50 | 10 | N |
| D176524 | 3.2 | 106 | 50 | 700 | 3 | N | 15 | 70 | 20 | N |
| D176525 | 3.4 | 110 | 70 | 700 | 3 | N | 15 | 70 | 20 | 100 L |
| D176526 | 3.1 | 54 | 50 L | 700 | N | N | 10 L | 30 | 15 | N |
| D176527 | 5.0 | 98 | 70 | 700 | 3 | N | 15 | 70 | 15 | 100 L |
| D176528 | 3.5 | 123 | 70 | 700 | 3 L | 500 L | 20 | 100 | 30 | 100 L |
| D176529 | 2.2 | 69 | 50 L | 500 | 5 | 500 L | 7 | 50 | B | N |
| D176530 | 5.5 | 118 | 70 | 700 | N | N | 15 | 70 | 15 | 100 L |
| D176531 | 4.3 | 115 | 70 | 700 | 2 | N | 15 | 70 | 15 | 100 L |

| Sample | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D176517 | N | 20 | B | 50 | 15 | 150 | 70 | 30 | 3 | 300 |
| D176518 | N | 20 | B | 70 | 20 | 150 | 150 | 30 | 5 | 150 |
| D176519 | N | 20 L | 150 L | 70 | 20 | 150 | 150 | 50 | 5 | 150 |
| D176520 | N | 20 L | B | 70 | 15 | 150 | 100 | 30 | 3 | 200 |
| D176521 | N | 20 L | B | 30 | 15 | 150 | 100 | 30 | 3 | 150 |
| D176522 | N | 20 L | B | 50 | 15 | 150 | 100 | 30 | 3 | 150 |
| D176523 | N | 20 L | B | 15 | 10 L | 150 | 70 | N | 2 N | 50 |
| D176524 | N | 20 L | B | 70 | 15 | 150 | 150 | 30 | | 3 150 |
| D176525 | N | 20 L | N | 50 | 15 | 150 | 150 | 30 | | 3 150 |
| D176526 | 10 | 20 L | B | 15 | 10 L | 70 | 50 | 20 | L | 2 200 |
| D176527 | N | 20 | N | 30 | 15 | 150 | 150 | 30 | | 5 200 |
| D176528 | N | 20 | N | 50 | 15 | 150 | 150 | 50 | | 5 150 |
| D176529 | N | 15 L | B | 20 | 10 | 50 | 70 | 50 | | B 70 |
| D176530 | N | 15 | N | 50 | 15 | 150 | 150 | 20 | | 2 150 |
| D176531 | N | 15 | N | 70 | 15 | 150 | 150 | 20 | | 2 150 |

| Sample | Total C% | Orgnc C% | Crbnt C% | Total S% |
|---|---|---|---|---|
| D176517 | 1.60 | 0.8 | 0.75 | 0.10 |
| D176518 | 1.78 | .7 | 1.12 | .71 |
| D176519 | 4.36 | 4.0 | .36 | .47 |
| D176520 | 2.32 | .6 | 1.74 | .24 |
| D176521 | 2.37 | .6 | 1.73 | .10L |
| D176522 | 2.43 | .6 | 1.80 | .10L |
| D176523 | 8.85 | .2 | 8.68 | .10L |
| D176524 | 2.02 | .6 | 1.42 | .10L |
| D176525 | 2.98 | 1.8 | 1.19 | .10 |
| D176526 | 1.36 | 1.2 | .16 | .10L |
| D176527 | 2.42 | 1.2 | 1.23 | .13 |
| D176528 | 3.48 | 3.0 | .50 | .22 |
| D176529 | 7.54 | .9 | 6.68 | .10L |
| D176530 | 7.65 | 7.6 | .04 | .13 |
| D176531 | 9.85 | 9.5 | .33 | .12 |

Table 7a.--Content of seven trace elements in 16 coal samples from USGS core hole RM-1, SW 1/4 NW 1/4 sec. 33, T. 56 N., R. 72 W., Campbell County, Wyo.

[Analyses on air-dried (32°C) coal. All values are in parts per million. L after a value means less than the value shown]

| Anderson coal bed 148.2 to 185.0 feet | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sample | Depth | As | F | Hg | Sb | Se | Th | U |
| D176630 | 148.2 - 149.0 | 2 | 50 | 0.07 | 0.2 | 0.7 | 2.8 | 0.5 |
| D176631 | 149.0 - 157.0 | 1 | 50 | .09 | .2 | .5 | 3.0L | .3 |
| D176632 | 157.0 - 162.0 | 1L | 55 | .10 | .1 | .6 | 3.1 | .2 |
| D176633 | 162.0 - 166.1 | 1L | 45 | .20 | .2 | 1.1 | 2.1 | .3 |
| D176634 | 166.1 - 167.0 | 1L | 20L | .07 | .1L | .4 | 3.0L | .3 |
| D176635 | 167.0 - 172.5 | 1 | 50 | .12 | .1L | 1.0 | 3.0L | .2 |
| D176636 | 172.5 - 175.0 | 1 | 40 | .08 | .1L | .5 | 3.0L | .2 |
| D176637 | 175.0 - 177.4 | 2 | 40 | .08 | .4 | .9 | 5.5 | .7 |
| D176638 | 177.4 - 181.0 | 2 | 110 | .21 | .9 | 1.3 | 9.2 | 2.8 |
| D176639 | 181.0 - 185.0 | 8 | 90 | .21 | 1.7 | 1.9 | 16.2 | 4.8 |

| Canyon A coal bed 187.8 to 210.3 feet | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sample | Depth | As | F | Hg | Sb | Se | Th | U |
| D176640 | 187.8 - 192.0 | 4 | 80 | 0.13 | 0.4 | 1.3 | 8.4 | 1.6 |
| D176641 | 195.0 - 198.0 | 1 | 45 | .06 | .1 | .6 | 3.0L | .4 |
| D176642 | 198.0 - 202.0 | 1 | 70 | .05 | .2 | .5 | 3.0L | .2L |
| D176643 | 202.0 - 204.9 | 1 | 85 | .08 | .1L | .4 | 5.0 | .2L |
| D176644 | 204.9 - 207.9 | 1 | 45 | .07 | .2 | .6 | 3.5 | .6 |
| D176645 | 207.9 - 210.3 | 2 | 60 | .14 | 1.0 | .8 | 10.7 | 2.0 |

Table 7b.--Content of seven trace elements in 11 coal samples from USGS core hole RM-2, SW 1/4 SW 1/4 sec. 25, T. 56 N., R. 73 W., Campbell County, Wyo.

[Analyses on air-dried (32°C) coal. All values are in parts per million. L after a value means less than the value shown]

| Anderson coal bed 198.4 to 232.6 feet | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sample | Depth | As | F | Hg | Sb | Se | Th | U |
| D177704 | 198.4 - 199.1 | 5.0 | 60 | 0.06 | 0.7 | 1.1 | 3.0L | 1.6 |
| D177705 | 199.1 - 208.1 | 1.0 | 95 | .10 | .2 | 1.0 | 3.0L | .6 |
| D177706 | 211.0 - 219.0 | .5 | 65 | .09 | .1L | .8 | 3.0L | .2L |
| D177707 | 224.9 - 232.6 | 1.0 | 150 | .11 | .5 | 1.0 | 3.0L | 1.9 |
| Canyon A coal bed 236.5 to 265.2 feet | | | | | | | | |
| Sample | Depth | As | F | Hg | Sb | Se | Th | U |
| D177708 | 236.5 - 243.0 | 3.5 | 150 | 0.12 | 1.0 | 1.4 | 8.5 | 4.1 |
| D177709 | 243.0 - 246.4 | 4.5 | 90 | .15 | .9 | 2.9 | 6.7 | 5.0 |
| D177710 | 249.8 - 256.2 | 1.5 | 40 | .03 | .1L | .7 | 3.0L | .2L |
| D177711 | 258.2 - 265.2 | 1.5 | 35 | .09 | .2 | .4 | 3.0L | .8 |
| Canyon B coal bed 311.2 to 330.6 feet | | | | | | | | |
| Sample | Depth | As | F | Hg | Sb | Se | Th | U |
| D177712 | 311.2 - 313.0 | 1.5 | 30 | 0.06 | 0.2 | 0.7 | 3.0L | 0.5 |
| D177713 | 313.0 - 323.0 | 1.0 | 40 | .06 | .1L | .3 | 3.0L | .2L |
| D177714 | 324.0 - 330.6 | 1.0 | 65 | .03 | .1 | .5 | 3.0L | .5 |

Table 7c.--Content of seven trace elements in 15 coal samples from USGS core hole RM-3, NW 1/4 NW 1/4 sec. 25, T. 56 N., R. 73 W., Campbell County, Wyo.

[Analyses on air-dried (32°C) coal. All values are in parts per million. L after a value means less than the value shown]

| Anderson coal bed 92.5 to 124.5 feet | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sample | Depth | As | F | Hg | Sb | Se | Th | U |
| D176502 | 92.5 - 95.3 | 2 | 60 | 0.09 | 0.5 | 1.2 | 6.2 | 1.5 |
| D176503 | 95.3 - 97.3 | 1 | 20L | .05 | .2 | .8 | 3.0L | .4 |
| D176504 | 97.3 - 99.5 | 1 | 75 | .08 | .2 | 1.1 | 3.0L | .7 |
| D176505 | 99.5 - 102.5 | 1 | 20L | .21 | .5 | 2.5 | 6.6 | 1.6 |
| D176506 | 102.5 - 105.3 | 1 | 30 | .05 | .1 | .8 | 3.0L | .5 |
| D176507 | 105.3 - 107.1 | 1 | 20L | .12 | .1 | .8 | 3.0L | .2L |
| D176508 | 107.1 - 110.5 | 1 | 20L | .13 | .1 | 1.2 | 3.0L | .5 |
| D176509 | 110.5 - 112.0 | 1L | 20L | .07 | .1 | .9 | 3 0L | .2L |
| D176510 | 112.0 - 114.5 | 1L | 25 | .10 | .1 | .9 | 3.0L | 1L |
| D176511 | 114.5 - 116.5 | 1 | 20L | .13 | .1 | .7 | 3.0L | .2L |
| D176512 | 116.5 - 118.5 | 1 | 25 | .13 | .2 | .8 | 3.0L | .4 |
| D176513 | 118.5 - 120.5 | 1 | 20 | .08 | .1 | 1.0 | 3.0L | .5 |
| D176514 | 120.5 - 122.5 | 2 | 20 | .05 | .2 | 1.0 | 3.0L | .3 |
| D176515 | 122.5 - 123.9 | 2 | 140 | .18 | .7 | 3.7 | 12.4 | 1.7 |
| D176616 | 123.9 - 124.5 | 4 | 165 | .21 | 2.1 | 2.7 | 17.8 | 8.3 |

Table 7d.--Content of seven trace elements in 21 coal samples from USGS core hole RM-4, SW 1/4 SW 1/4 sec. 25, T. 56 N., R. 73 W., Campbell County, Wyo.

[Analyses on air-dried (32°C) coal. All values are in parts per million. L after a value means less than the value shown]

| Anderson coal bed 129.4 to 167.0 feet | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sample | Depth | As | F | Hg | Sb | Se | Th | U |
| D176799 | 129.4 - 130.0 | 3 | 25 | 0.02 | 0.8 | 0.8 | 3.0L | 0.9 |
| D176800 | 130.0 - 136.4 | 1 | 40 | .03 | .1 | 1.1 | 3.0L | .5 |
| D176801 | 136.4 - 143.0 | 1 | 45 | .08 | .2 | 1.4 | 9.5 | .4 |
| D176802 | 143.0 - 148.9 | 1 | 30 | .05 | .1L | .8 | 3.0L | .2 |
| D176803 | 148.9 - 156.7 | 1 | 50 | .23 | .1L | 1.2 | 3.0L | .2 |
| D176804 | 156.7 - 163.0 | 1 | 40 | .08 | .1L | .7 | 2.2 | .2 |
| D176805 | 163.0 - 167.0 | 4 | 100 | .07 | .8 | 2.1 | 15.1 | 2.8 |
| Canyon A coal bed 298.0 to 320.5 feet | | | | | | | | |
| Sample | Depth | As | F | Hg | Sb | Se | Th | U |
| D176806 | 298.0 - 299.0 | 20 | 40 | 0.34 | 1.5 | 2.4 | 3.9 | 1.3 |
| D176807 | 299.0 - 303.0 | 3 | 65 | .09 | .3 | .8 | 3.0L | .9 |
| D176808 | 305.0 - 306.0 | 2 | 70 | .09 | .6 | 1.1 | 7.1 | .8 |
| D176809 | 306.0 - 308.4 | 1 | 65 | .04 | .1L | .7 | 2.7 | .3 |
| D176810 | 308.4 - 312.0 | 1 | 40 | .08 | .1L | .6 | 2.3 | .2 |
| D176811 | 312.0 - 316.0 | 1 | 55 | .03 | .2 | .4 | 5.8 | .3 |
| D176812 | 316.0 - 320.5 | 1 | 55 | .03 | .3 | .5 | 3.0L | .8 |
| Canyon B coal bed 323.0 to 349.0 feet | | | | | | | | |
| Sample | Depth | As | F | Hg | Sb | Se | Th | U |
| D176813 | 323.0 - 327.0 | 2 | 40 | 0.04 | 0.2 | 0.9 | 2.8 | 1.0 |
| D176814 | 327.0 - 332.3 | 1 | 45 | .03 | .2 | .7 | 4.6 | .2L |
| D176815 | 332.3 - 335.3 | 1 | 40 | .02 | .2 | .5 | 4.8 | .8 |
| D176816 | 335.3 - 338.4 | 1 | 25 | .02 | .2 | .6 | 3.0L | .2L |
| D176817 | 338.4 - 342.0 | 1 | 25 | .01L | .1L | .4 | 3.0L | .2L |
| D176818 | 342.0 - 346.0 | 3 | 70 | .03 | .4 | 1.2 | 7.8 | 1.3 |
| D176819 | 346.0 - 349.0 | 2 | 80 | .06 | .4 | .9 | 4.8 | 1.4 |

Table 7e.--Content of seven trace elements in 15 coal samples from USGS core hole RM-5, SE 1/4 SE 1/4 sec. 27, T. 56 N., R. 73 W., Campbell County, Wyo.

[Analyses on air-dried (32°C) coal. All values are in parts per million. L after a value means less than the value shown]

| Anderson coal bed 135.2 to 168.6 feet | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sample | Depth | As | F | Hg | Sb | Se | Th | U |
| D177715 | 135.2 - 136.2 | 5.0 | 65 | 0.23 | 0.7 | 0.8 | 3.0L | 1.9 |
| D177716 | 136.2 - 140.0 | 1.0 | 40 | .04 | .2 | .8 | 3.0L | .7 |
| D177717 | 140.0 - 149.0 | 4.0 | 60 | .13 | .2 | 1.4 | 3.0L | 1.6 |
| D177718 | 149.0 - 157.2 | .5 | 55 | .06 | .1L | .9 | 3.0L | .2L |
| D177719 | 157.2 - 165.6 | 1.0 | 20 | .09 | .1L | .7 | 3.0L | .2L |
| D177720 | 165.6 - 168.6 | 2.0 | 130 | .17 | 1.6 | 2.3 | 13.6 | 7.6 |
| Canyon coal bed 354.9 to 395.5 feet | | | | | | | | |
| Sample | Depth | As | F | Hg | Sb | Se | Th | U |
| D177721 | 354.9 - 356.4 | 18.0 | 20L | 0.30 | 0.8 | 0.7 | 3.0L | 0.7 |
| D177722 | 356.5 - 360.0 | 2.0 | 20 | .06 | .2 | 1.0 | 3.0L | .6 |
| D177723 | 360.0 - 361.8 | 3.5 | 220 | .06 | .5 | 1.0 | 3.0L | 5.1 |
| D177724 | 361.8 - 370.7 | 2.0 | 20L | .06 | .1L | .6 | 3.0L | .4 |
| D177725 | 371.1 - 374.8 | 1.0 | 65 | .04 | .3 | .5 | 3.0L | 1.2 |
| D177726 | 374.8 - 375.9 | 5.5 | 433 | .32 | .7 | 1.8 | 15.8 | 4.9 |
| D177727 | 375.9 - 384.3 | 1.0 | 25 | .03 | .2 | .3 | 3.0L | .3 |
| D177728 | 384.3 - 392.2 | 1.5 | 20L | .03 | .2 | .5 | 3.0L | .4 |
| D177729 | 392.2 - 395.5 | 5.5 | 100 | .25 | .7 | 1.1 | 3.0L | 2.9 |

Table 7f.--Content of seven trace elements in 11 coal samples from USGS core hole RM-6, NW 1/4 NE 1/4 sec. 21, T. 56 N., R. 73 W., Campbell County, Wyo.

[Analyses on air-dried (32°C) coal. All values are in parts per million. L after a value means less than the value shown]

| Anderson coal bed 88.9 to 120.0 feet | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sample | Depth | As | F | Hg | Sb | Se | Th | U |
| D177730 | 88.9 - 90.4 | 1.5 | 30 | 0.03 | 0.4 | 0.8 | 3.0L | 1.2 |
| D177731 | 90.4 - 97.7 | 2.0 | 60 | .08 | .5 | 1.6 | 3.0L | 2.2 |
| D177732 | 97.7 - 107.4 | 5.0 | 65 | .24 | .3 | 2.2 | 3.0L | 1.9 |
| D177733 | 107.4 - 116.9 | 1.0 | 20 | .05 | .1 | .7 | 3.0L | .2L |
| D177734 | 116.9 - 120.0 | 1.0 | 75 | .04 | .3 | 2.0 | 3.0L | 1.2 |
| Canyon coal bed 256.5 to 302.7 feet | | | | | | | | |
| Sample | Depth | As | F | Hg | Sb | Se | Th | U |
| D177735 | 256.5 - 257.2 | 9.0 | 215 | 0.07 | 2.1 | 0.9 | 3.0L | 3.7 |
| D177736 | 257.2 - 261.2 | 2.6 | 70 | .3 | .3 | .8 | 3.0L | 1.4 |
| D177737 | 272.1 - 272.7 | 145.0 | 365 | .33 | 1.0 | 3.2 | 3.0L | 6.3 |
| D177738 | 272.7 - 285.2 | 2.0 | 90 | .12 | .3 | 1.8 | 4.8 | 1.3 |
| D177739 | 285.2 - 297.9 | .5 | 50 | .04 | .2 | .9 | 3.0L | .4 |
| D177740 | 297.9 - 302.7 | .5 | 25 | .03 | .2 | .7 | 3.0L | .7 |

Table 7g.--Content of seven trace elements in 13 coal samples from USGS core hole RM-7, NE 1/4 NW 1/4 sec. 26, T. 55 N., R. 73 W., Campbell County, Wyo.

[Analyses on air-dried (32°C) coal. All values are in parts per million. L after a value means less than the value shown]

| Anderson coal bed 133.2 to 170.3 feet | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Sample | Depth | As | F | Hg | Sb | Se | Th | U |
| D177741 | 133.2 - 134.0 | 1.0 | 40 | 0.03 | 0.9 | 1.8 | 3.0L | 0.7 |
| D177742 | 134.0 - 141.0 | .5 | 35 | .05 | .1L | 1.0 | 3.0L | .2L |
| D177743 | 141.0 - 154.0 | .5 | 50 | .09 | .2 | 1.1 | 3.0L | .6 |
| D177744 | 154.0 - 161.9 | .5 | 70 | .07 | .1L | 1.1 | 3.0L | .2L |
| D177745 | 161.9 - 170.3 | 1.0 | 50 | .05 | .5 | 1.1 | 3.0L | 1.8 |
| Canyon coal bed 286.2 to 329.6 feet | | | | | | | | |
| Sample | Depth | As | F | Hg | Sb | Se | Th | U |
| D177746 | 286.2 - 287.3 | 31.0 | 85 | 0.50 | 2.9 | 1.6 | 5.9 | 1.6 |
| D177747 | 287.3 - 297.3 | 3.5 | 45 | .10 | .1 | 1.1 | 3.0L | .2L |
| D177748 | 299.2 - 306.3 | .5 | 20L | .06 | .1L | .6 | 3.0L | .2L |
| D177749 | 306.3 - 317.7 | 1.0 | 45 | .04 | .1L | .6 | 3.0L | .2L |
| D177750 | 317.7 - 326.0 | 2.5 | 35 | .09 | .1L | .8 | 3.0L | .2L |
| D177751 | 326.0 - 329.6 | 2.0 | 100 | .09 | 1.0 | 1.2 | 7.1 | 3.0 |
| Cook coal bed 369.6 to 382.0 feet | | | | | | | | |
| Sample | Depth | As | F | Hg | Sb | Se | Th | U |
| D177752 | 369.6 - 370.8 | 2.5 | 325 | 0.22 | 0.8 | 1.9 | 15.1 | 3.6 |
| D177753 | 370.8 - 382.0 | 1.0 | 30 | .06 | .2 | .8 | 3.0L | 1.0 |

Table 8a.—Major, minor, and trace element composition of 10 samples from Anderson coal bed, USGS core hole RM-1 SW 1/4 NW 1/4 Sec. 33, T. 56 N., R. 72 W., Campbell County, Wyoming reported on a whole coal basis

[Values are in either percent or parts per million, Si, Al, Ca, Mg, Na, K, Fe, Mn, Ti, P, Cl, Cd, Cu, Li, Pb, and Zn values were calculated from analysis of ash. As, F, Hg, Sb, Se, Th, and U values are from direct determinations on air-dried (32°C) coal. The remaining analyses were calculated from spectrographic determinations on ash. L, less than value shown; N, not detected; B, not determined.]

| SAMPLE | DEPTH | Si % | Al % | Ca % | Mg % | Na % | K % | Fe % | Mn ppm | Ti % | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176630 | 148.2 - 149.0 | 2.2 | 0.58 | 1.5 | 0.270 | 0.134 | 0.10 | 0.31 | 12 | 0.032 | 48 L |
| D176631 | 149.0 - 157.0 | .36 | .34 | 1.6 | .258 | .130 | .023 | .27 | 8.7 | .020 | 37 |
| D176632 | 157.0 - 162.0 | .41 | .38 | 1.5 | .249 | .132 | .016 | .26 | 8.2 | .029 | 80 |
| D176633 | 162.0 - 166.1 | 1.1 | .42 | 1.4 | .260 | .127 | .024 | .24 | 6.4 | .064 | 66 |
| D176634 | 166.1 - 167.0 | .43 | .37 | 1.4 | .243 | .124 | .016 | .22 | 7.4 | .020 | 26 L |
| D176635 | 167.0 - 172.5 | .60 | .37 | 1.5 | .257 | .126 | .017 | .22 | 8.7 | .035 | 120 |
| D176636 | 172.5 - 175.0 | .28 | .28 | 1.2 | .221 | .132 | .013 | .26 | 17 | .018 | 65 |
| D176637 | 175.0 - 177.4 | .48 | .60 | 1.1 | .184 | .106 | .023 | .22 | 11 | .028 | 670 |
| D176638 | 177.4 - 181.0 | 2.8 | 2.2 | 1.5 | .285 | .122 | .088 | .33 | 8.0 | .098 | 1200 |
| D176639 | 181.0 - 185.0 | 4.2 | 2.2 | 1.6 | .337 | .116 | .13 | .68 | 12 | 12 | 740 |

| SAMPLE | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm | Th ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D176630 | 2 | 0.11 L | 6.2 | 50 | 0.07 | 1.3 | 2.8 L | 0.2 | 0.7 | 2.8 |
| D176631 | 1 | .06 L | 7.8 | 50 | .09 | .6 L | 1.5 L | .2 | .5 | 3.0 L |
| D176632 | 1 L | .06 L | 8.3 | 55 | .10 | 1.3 | 1.6 L | .1 | .6 | 3.1 |
| D176633 | 1 L | .07 L | 16.3 | 45 | .20 | 1.7 | 1.9 L | .2 | 1.1 | 2.1 |
| D176634 | 1 L | .06 L | 5.5 | 20 L | .07 | .8 | 1.5 L | .1 L | .4 | 3.0 L |
| D176635 | 1 | .07 L | 9.1 | 50 | .12 | 1.3 | 1.7 L | .1 L | 1.0 | 3.0 L |
| D176636 | 1 | .05 L | 4.7 | 40 | .08 | .5 L | 1.3 L | .1 L | .5 | 3.0 L |
| D176637 | 2 | .06 L | 9.7 | 40 | .08 | 4.2 | 1.5 L | .4 | .9 | 5.5 |
| D176638 | 2 | .16 L | 21.0 | 110 | .21 | 22.7 | 4.8 | .9 | 1.3 | 9.2 |
| D176639 | 8 | .42 | 26.8 | 90 | .21 | 17.7 | 5.2 L | 1.7 | 1.9 | 16.2 |

| SAMPLE | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Ce ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D176630 | 0.5 | 7.4 | 30 | 300 | 0.3 | N | 1.5 | 7 | 2 | N |
| D176631 | .3 | 2.9 | 50 | 500 | N | N | 1.5 | 5 | 1.5 | N |
| D176632 | .2 | 1.8 | 30 | 300 | N | N | 1 | 2 | 1.5 | N |
| D176633 | .3 | 3.0 | 20 | 200 | N | N | 1 | 3 | 1.5 | N |
| D176634 | .3 | 3.3 | 50 | 500 | N | N | 1 | 5 | 1 | N |
| D176635 | .2 | 2.7 | 30 | 500 | N | 30 L | 1 | 3 | 1 | N |
| D176636 | .2 | 2.1 | 30 | 300 | N | N | .7 | 3 | .7 | N |
| D176637 | .7 | 1.3 | 30 | 300 | .2 | N | 1.5 | 10 | 2 | N |
| D176638 | 2.8 | 16.6 | 20 | 500 | 1 | N | 2 | 20 | 7 | N |
| D176639 | 4.8 | 62.8 | 50 | 700 | 2 | 100 L | 5 | 30 | 7 | N |

| SAMPLE | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-B | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176630 | 10 L | 0.7 | 2 L | N | 2 | 1.5 | 70 | 15 | 5 | 0.5 | 15 |
| D176631 | N | .7 | 1.5 L | B | 2 | 1.5 | 100 | 10 | 2 | .2 | 10 |
| D176632 | 7 L | .5 | 1.5 L | N | 1.5 | 1.5 | 100 | 15 | 2 | .2 | 10 |
| D176633 | 7 L | N | 1.5 L | N | 1.5 | 1.5 | 50 | 15 | 2 | .2 | 10 |
| D176634 | N | .5 | 1 L | B | 1.5 | 1 | 100 | 10 | 1.5 | .15 | 10 |
| D176635 | 7 L | .5 | 1.5 L | N | 2 | 1.5 | 150 | 10 | 2 | .2 | 10 |
| D176636 | 5 L | .7 | 1 L | N | 1.5 | 1 | 100 | 7 | 1.5 | 15 | 7 |
| D176637 | 7 | 3 | 1.5 L | N | 5 | 2 | 100 | 20 | 5 | .3 | 10 |
| D176638 | 15 L | 2 | 3 | N | 7 | 5 | 150 | 50 | 10 | .7 | 30 |
| D176639 | 20 | 7 | 5 | 30 | 15 | 10 | 150 | 100 | 15 | 1.5 | 50 |

Table 8b.—Major, minor, and trace element composition of 6 samples from Canyon A coal bed, USGS core hole RM-1 SW 1/4 NW 1/4 Sec. 33, T. 56 N., R. 73 W., Campbell County, Wyoming reported on a whole coal basis

[Values are in either percent or parts per million, Si, Al, Ca, Mg, Na, K, Fe, Mn, Ti, P, Cl, Cd, Cu, Li, Pb, and Zn values were calculated from analysis of ash. As, F, Hg, Sb, Se, Th, and U values are from direct determinations on air-dried (32°C) coal. The remaining analyses were calculated from spectrographic determinations on ash. L, less than value shown; N, not detected; B, not determined.]

| SAMPLE | DEPTH | Si % | Al % | Ca % | Mg % | Na % | K % | Fe % | Mn ppm | Ti % | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176640 | 187.8 - 192.0 | 1.6 | 0.96 | 1.5 | 0.287 | 0.134 | 0.058 | 0.26 | 7.8 | 0.071 | 1094 |
| D176641 | 195.0 - 198.0 | .45 | .21 | 1.4 | .268 | .122 | .016 | .23 | 17 | .015 | 44 |
| D176642 | 198.0 - 202.0 | .13 | .16 | 1.0 | .258 | .113 | .013 | .20 | 18 | .010 | 36 |
| D176643 | 202.0 - 204.9 | .33 | .34 | 1.3 | .268 | .111 | .023 | .22 | 5.7 | .014 | 275 |
| D176644 | 204.9 - 207.9 | .64 | .45 | 1.4 | .300 | .112 | .022 | .21 | 6.5 | .051 | 300 |
| D176645 | 207.9 - 210.3 | 2.3 | 1.4 | 1.1 | .269 | .123 | .11 | .37 | 6.1 | .052 | 67 |

| SAMPLE | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm | Th ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D176640 | 4 | 0.11 L | 15.9 | 80 | 0.13 | 5.3 | 2.8 L | 0.4 | 1.3 | 8.4 |
| D176641 | 1 | .06 L | 4.5 | 45 | .06 | .6 L | 1.5 L | .1 | .6 | 3.0 L |
| D176642 | 1 | .05 L | 3.3 | 70 | .05 | .5 L | 1.2 L | .2 | .5 | 3.0 L |
| D176643 | 1 | .06 L | 3.9 | 85 | .08 | .7 | 1.4 L | .1 L | .4 | 5.0 |
| D176644 | 1 | .07 L | 16.8 | 45 | .07 | 1.8 | 2.2 | .2 | .6 | 3.5 |
| D176645 | 2 | .18 | 18.2 | 60 | .14 | 5.4 | 6.1 | 1.0 | .8 | 10.7 |

| SAMPLE | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Ce ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D176640 | 1.6 | 19.9 | 30 | 300 | 0.3 | 50 L | 1.5 | 10 | 3 | N |
| D176641 | .4 | 1.3 | 50 | 150 | N | N | .7 | 1.5 | .7 | N |
| D176642 | .2 L | 1.3 | 30 | 150 | N | N | .7 | 1.5 | .7 | N |
| D176643 | .2 L | 2.5 | 50 | 500 | N | N | 1 | 1.5 | 1 | N |
| D176644 | .6 | 2.2 | 50 | 200 | N | N | 1 | 5 | 1.5 | 2 |
| D176645 | 2.0 | 22.3 | 30 | 150 | 2 | 70 L | 2 | 15 | 7 | N |

| SAMPLE | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-B | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176640 | 15 | 2 | 2 | 20 | 5 | 3 | 100 | 30 | 10 | 0.7 | 15 |
| D176641 | N | .5 | 1 L | B | 1.5 | 1 | 70 | 5 | 3 | .15 | 10 |
| D176642 | N | .3 | 1 L | B | 1.5 | .7 | 100 | .7 | 1.5 | .15 | 7 |
| D176643 | N | .5 | 1 L | B | 1.5 | 1 | 100 | 10 | 3 | .15 | 10 |
| D176644 | 7 L | .7 | 1.5 L | N | 2 | 2 | 100 | 20 | 5 | .3 | 10 |
| D176645 | 15 L | 2 | 2 | N | 3 | 3 | 30 | 30 | 10 | 1 | 20 |

Table 8c.—Major, minor, and trace element composition of 4 samples from Anderson coal bed, USGS core hole RM-2 SW 1/4 NW 1/4 Sec. 25, T. 56 N., R. 73 W., Campbell County, Wyoming reported on a whole coal basis

[Values are in either percent or parts per million, Si, Al, Ca, Mg, Na, K, Fe, Mn, Ti, P, Cl, Cd, Cu, Li, Pb, and Zn values were calculated from analysis of ash. As, F, Hg, Sb, Se, Th, and U values are from direct determinations on air-dried (32°C) coal. The remaining analyses were calculated from spectrographic determinations on ash. L, less than value shown; N, not detected; B, not determined.]

| SAMPLE | DEPTH | Si % | Al % | Ca % | Mg % | Na % | K % | Fe % | Mn ppm | Ti % | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177704 | 194.4 - 199.1 | 4.8 | 0.83 | 1.1 | 0.294 | 0.134 | 0.15 | 0.37 | 68 L | 0.060 | 770 L |
| D177705 | 199.1 - 208.1 | 1.3 | .45 | 1.2 | .279 | .137 | .030 | .19 | 34 L | .065 | 380 L |
| D177706 | 211.0 - 219.0 | .71 | .34 | 1.1 | .277 | .138 | .009 | .15 | 26 L | .041 | 300 L |
| D177707 | 224.9 - 232.6 | 3.0 | 1.8 | .99 | .296 | .134 | .11 | .26 | 60 L | .086 | 680 L |

| SAMPLE | Cl % | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D177704 | 0.035 L | 5.0 | 0.18 L | 10.6 | 60 | 0.06 | 2.6 | 4.4 L | 0.7 | 1.1 |
| D177705 | .017 L | 1.0 | .09 L | 16.4 | 95 | .10 | 1.5 | 2.6 | .2 | 1.0 |
| D177706 | .014 L | .5 | .07 L | 9.8 | 65 | .09 | 1.0 | 2.4 | .1 L | .8 |
| D177707 | .031 L | 1.0 | .16 L | 19.3 | 150 | .11 | 7.6 | 5.5 | .5 | 1.0 |

| SAMPLE | Th ppm | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177704 | 3.0 L | 1.6 | 20.1 | 50 | 500 | 3 | 3 | 15 | 10 | 3 L |
| D177705 | 3.0 L | .6 | 4.5 | 70 | 700 | N | 1.5 | 5 | 2 | N |
| D177706 | 3.0 L | .2 L | 3.2 | 50 | 500 | N | 1 | 3 | 2 | N |
| D177707 | 3.0 L | 1.9 | 20.7 | 50 | 500 | .7 | 2 | 20 | 10 | N |

| SAMPLE | Mo ppm-S | Nb ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|---|---|---|
| D177704 | 1.5 | 10 | 5 | 5 | 150 | 50 | 15 | 3 | 30 |
| D177705 | .7 | 1.5 | 1.5 | 1.5 | 150 | 15 | 5 | .7 | 15 |
| D177706 | .5 | N | 1.5 | 1.5 | 100 | 15 | 2 | .3 | 10 |
| D177707 | 1.5 | N | 5 | 5 | 100 | 50 | 7 | 1 | 20 |

Table 8d.—Major, minor, and trace element composition of 4 samples from Canyon A coal bed, USGS core hole RM-2 SW 1/4 SW 1/4 Sec. 25, T. 56 N., R. 73 W., Campbell County, Wyoming reported on a whole coal basis

[Values are in either percent or parts per million, Si, Al, Ca, Mg, Na, K, Fe, Mn, Ti, P, Cl, Cd, Cu, Li, Pb, and Zn values were calculated from analysis of ash. As, F, Hg, Sb, Se, Th, and U values are from direct determinations on air-dried (32°C) coal. The remaining analyses were calculated from spectrographic determinations on ash. L, less than value shown; N, not detected; B, not determined.]

| SAMPLE | DEPTH | Si % | Al % | Ca % | Mg % | Na % | K % | Fe % | Mn ppm | Ti % | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177708 | 236.5 - 243.0 | 6.4 | 2.9 | 0.92 | 0.328 | 0.126 | .022 | 0.51 | 100 L | 0.15 | 1100 L |
| D177709 | 243.0 - 246.4 | 4.2 | 2.4 | .85 | .294 | .121 | .070 | .34 | 84 L | .14 | 940 L |
| D177710 | 249.8 - 256.2 | .30 | .25 | .96 | .266 | .126 | .009 | .27 | 31 | .021 | 250 L |
| D177711 | 258.2 - 265.2 | .60 | .38 | .85 | .257 | .115 | .013 | .14 | 24 L | .025 | 270 L |

| SAMPLE | Cl % | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D177708 | 0.054 L | 3.5 | 0.27 L | 32.5 | 150 | 0.12 | 16.1 | 10.8 | 1.0 | 1.4 |
| D177709 | .043 L | 4.5 | .22 | 53.1 | 90 | .15 | 27.4 | 11.9 | .9 | 2.9 |
| D177710 | .011 L | 1.5 | .06 L | 5.7 | 40 | .03 | .6 L | 1.4 L | .1 L | .7 |
| D177711 | .012 L | 1.5 | .06 L | 10.2 | 35 | .09 | 1.0 | 3.1 | .2 | .4 |

| SAMPLE | Th ppm | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | La ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177708 | 8.5 | 4.1 | 38.7 | 50 | 700 | 2 | 5 | 50 | 15 | 30 L |
| D177709 | 6.7 | 5.0 | 84.9 | 50 | 700 | 1.5 | 3 | 15 | 10 | 20 L |
| D177710 | 3.0 L | .2 L | 2.8 | 70 | 500 | N | .7 | 3 | 1 | N |
| D177711 | 3.0 L | .8 | 1.8 | 70 | 300 | 1 | 1 | 5 | 2 | N |

| SAMPLE | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177708 | 5 | 5 | N | 15 | 5 | 500 | 70 | 20 | 2 | 50 |
| D177709 | 7 | 5 | 30 | 15 | 5 | 500 | 70 | 15 | 2 | 30 |
| D177710 | .5 | N | B | 1.5 | 1 | 100 | 10 | 1.5 | .15 | 7 |
| D177711 | .7 | 1.5 | B | 3 | 2 | 100 | 20 | 5 | .5 | 10 |

Table 8e.—Major, minor, and trace element composition of 3 samples from Canyon B coal bed, USGS core hole RM-2 SW 1/4 SW 1/4 Sec. 25, T. 56 N., R. 73 W., Campbell County, Wyoming reported on a whole coal basis

[Values are in either percent or parts per million, Si, Al, Ca, Mg, Na, K, Fe, Mn, Ti, P, Cl, Cd, Cu, Li, Pb, and Zn values were calculated from analysis of ash. As, F, Hg, Sb, Se, Th, and U values are from direct determinations on air-dried (32°C) coal. The remaining analyses were calculated from spectrographic determinations on ash. L, less than value shown; N, not detected; B, not determined.]

| SAMPLE | DEPTH | Si % | Al % | Ca % | Mg % | Na % | K % | Fe % | Mn ppm | Ti % | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177712 | 311.3 - 313.0 | 0.44 | 0.32 | 0.90 | 0.339 | 0.098 | 0.010 | 0.34 | 28 L | 0.013 | 320 L |
| D177713 | 313.0 - 323.0 | .36 | .20 | .98 | .306 | .108 | .007 | .62 | 61 | .015 | 520 |
| D177714 | 324.0 - 330.6 | .73 | .49 | .87 | .249 | .122 | .021 | .28 | 32 | .022 | 790 |

| SAMPLE | Cl % | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D177712 | 0.015 L | 1.5 | 0.07 L | 4.2 | 30 | 0.06 | 0.07 L | 1.8 | 0.2 | 0.7 |
| D177713 | .014 L | 1.0 | .07 L | 2.6 | 40 | .06 | .7 L | 1.8 L | .1 L | .3 |
| D177714 | .015 L | 1.0 | .07 L | 5.7 | 65 | .03 | 1.4 | 3.8 | .1 | .5 |

| SAMPLE | Th ppm | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177712 | 3.0 L | 0.5 | 1.5 | 70 | 300 | 3 | 5 | 5 | 3 | 7 |
| D177713 | 3.0 L | .2 L | 2.2 | 70 | 700 | N | .7 L | 1.5 | 1 | N |
| D177714 | 3.0 L | .5 | 2.6 | 70 | 700 | .2 | 1 | 5 | 2 | N |

| SAMPLE | La ppm-S | Mo ppm-S | Nb ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-B | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177712 | N | 0.5 | 1.5 | 7 | 1.5 | 70 | 7 | 7 | 0.7 | 7 |
| D177713 | N | .5 | N | 1.5 | N | 150 | 5 | 1.5 | B | 7 |
| D177714 | 7 L | .7 | 1.5 | 3 | 1 | 150 | 10 | 5 | .3 | 7 |

Table 8f.—Major, minor, and trace element composition of 15 samples from Anderson coal bed, USGS core hole RM-3 NW 1/4 NW 1/4 Sec. 25, T. 56 N., R. 73 W., Campbell County, Wyoming reported on a whole coal basis

[Values are in either percent or parts per million, Si, Al, Ca, Mg, Na, K, Fe, Mn, Ti, P, Cl, Cd, Cu, Li, Pb, and Zn values were calculated from analysis of ash. As, F, Hg, Sb, Se, Th, and U values are from direct determinations on air-dried (32°C) coal. The remaining analyses were calculated from spectrographic determinations on ash. L, less than value shown; N, not detected; B, not determined.]

| SAMPLE | DEPTH | Si % | Al % | Ca % | Mg % | Na % | K % | Fe % | Mn ppm | Ti % | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176502 | 992.5 - 95.3 | 3.8 | 0.95 | 1.8 | 0.370 | 0.077 | 0.15 | 0.45 | 56 | 0.080 | 720 |
| D176503 | 95.3 - 97.3 | .76 | .56 | 1.7 | .317 | .077 | .047 | .31 | 52 | .027 | 750 |
| D176504 | 97.3 - 99.5 | .91 | .64 | 1.8 | .334 | .089 | .022 | .29 | 64 | .038 | 790 |
| D176505 | 99.5 - 102.5 | 2.5 | 1.6 | 2.0 | .365 | .102 | 036 | .34 | 74 | .14 | 2200 |
| D176506 | 102.5 - 105.3 | .37 | .43 | 1.7 | .288 | .113 | .012 | .26 | 57 | .027 | 720 |
| D176507 | 105.3 - 107.1 | .52 | .54 | 1.9 | .320 | .122 | .011 | .26 | 67 | .038 | 1500 |
| D176508 | 107.1 - 110.5 | .60 | .42 | 1.8 | .316 | .122 | .010 | .26 | 67 | .046 | 850 |
| D176509 | 110.5 - 112.0 | .20 | .31 | 1.5 | .266 | .133 | .009 | .25 | 50 | .024 | 830 |
| D176510 | 112.0 - 114.5 | .49 | .38 | 1.7 | .298 | .131 | .010 | .20 | 63 | .021 | 890 |
| D176511 | 114.5 - 116.5 | .63 | .37 | 1.8 | .320 | .139 | .010 | .26 | 67 | .026 | 870 |
| D176512 | 116.5 - 118.5 | .50 | .38 | 1.7 | .306 | .147 | .012 | .26 | 61 | .038 | 820 |
| D176513 | 118.5 - 120.5 | .50 | .39 | 1.7 | .304 | .152 | .010 | .24 | 60 | .027 | 1000 |
| D176514 | 120.5 - 122.5 | .18 | .37 | 1.6 | .302 | .145 | .009 | .25 | 54 | .019 | 740 |
| D176515 | 122.5 - 123.9 | 5.5 | 3.6 | 1.6 | .445 | .161 | .28 | .58 | 55 | .14 | 1400 |
| D176516 | 123.9 - 124.5 | 8.7 | 5.4 | 1.0 | .414 | .150 | .42 | .82 | 35 | .19 | 390 |

| SAMPLE | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm | Th ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D176502 | 2 | 0.16 L | 19.4 | 60 | 0.09 | 3.2 L | 4.0 L | 0.5 | 1.2 | 6.2 |
| D176503 | 1 | .08 L | 9.7 | 20 L | .05 | 1.6 L | 2.0 L | .2 | .8 | 3.0 L |
| D176504 | 1 | .09 L | 11.0 | 75 | .08 | 4.1 | 2.2 | .2 | 1.1 | 3.0 L |
| D176505 | 1 | .15 L | 36.3 | 20 L | .21 | 17.2 | 4.5 | .5 | 2.5 | 6.6 |
| D176506 | 1 | .07 L | 9.6 | 30 | .05 | 2.2 | 1.7 L | .1 | .8 | 3.0 L |
| D176507 | 1 | .08 L | 12.2 | 20 L | .12 | 2.5 | 1.9 L | .1 | .8 | 3.0 L |
| D176508 | 1 | .07 L | 16.0 | 20 L | .13 | 2.8 | 1.9 L | .1 | 1.2 | 3.0 L |
| D176509 | 1 L | .06 L | 7.3 | 20 L | .07 | 1.2 L | 1.4 L | .1 | .9 | 3.0 L |
| D176510 | 1 L | .07 L | 6.2 | 25 | .10 | 1.3 | 1.7 L | .1 | .9 | 3.0 L |
| D176511 | 1 | .07 L | 7.0 | 20 L | .13 | 1.5 | 1.8 L | .1 | .7 | 3.0 L |
| D176512 | 1 | .07 L | 10.6 | 25 | .13 | 1.4 L | 2.8 | .2 | .8 | 3.0 L |
| D176513 | 1 | .07 L | 8.8 | 20 | .08 | 1.4 L | 1.8 | .1 | 1.0 | 3.0 L |
| D176514 | 2 | .07 L | 6.1 | 20 | .05 | 1.3 L | 1.3 | .2 | 1.0 | 3.0 L |
| D176515 | 2 | .26 L | 48.4 | 140 | .18 | 12.2 | 7.8 | .7 | 3.7 | 12.4 |
| D176516 | 4 | .37 | 52.0 | 165 | .21 | 23.4 | 20.1 | 2.1 | 2.7 | 17.8 |

Table 8f.--Major, minor, and trace element composition of 15 samples from Anderson coal bed, USGS core hole RM-3 NW 1/4 NW 1/4 Sec. 25, T. 56 N., R. 73 W., Campbell County, Wyoming reported on a whole coal basis.-Continued

| SAMPLE | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Ce ppm-S | Co ppm-S | Cr ppm-S | Ca ppm-S |
|---|---|---|---|---|---|---|---|---|---|
| D176502 | 1.5 | 12.3 | 50 | 300 | N | N | 2 | 10 | 5 |
| D176503 | .4 | 2.6 | 50 | 500 | N | N | 1 | 5 | 2 |
| D176504 | .7 | 3.1 | 70 | 500 | N | N | 1.5 | 7 | 2 |
| D176505 | 1.6 | 4.2 | 50 | 1000 | N | 70 L | 2 | 10 | 7 |
| D176506 | .5 | 4.3 | 70 | 500 | N | N | 1.5 | 3 | 2 |
| D176507 | .2 L | 2.3 | 50 | 700 | N | N | 1 | 2 | 2 |
| D176508 | .5 | 3.1 | 50 | 500 | N | N | 1 | 2 | 1 |
| D176509 | .2 L | 1.7 | 70 | 500 | N | N | 1 | 1.5 | 1.5 |
| D176510 | .2 L | 4.5 | 50 | 700 | N | N | 1 | 3 | 1 |
| D176511 | .2 L | 2.1 | 50 | 500 | N | N | 1 | 2 | 1 |
| D176512 | .4 | 1.8 | 50 | 500 | N | N | 1 | 3 | 1 |
| D176513 | .5 | 3.7 | 50 | 700 | N | N | 1 | 3 | 1.5 |
| D176514 | .3 | 9.9 | 50 | 500 | N | N | 2 | 5 | 2 |
| D176515 | 1.7 | 14.3 | 50 | 700 | .7 | N | 5 | 50 | 15 |
| D176516 | 8.3 | 89.3 | 50 | 300 | 2 | N | 5 | 50 | 20 |

| SAMPLE | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-B | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176502 | 15 L | 1 | 5 | N | 3 | 3 | 100 | 20 | 10 | 1 | 50 |
| D176503 | 7 L | .7 | 1.5 L | N | 2 | 1 | 70 | 10 | 2 | .5 | 10 |
| D176504 | N | .7 | 1.5 L | B | 2 | 1.5 | 100 | 15 | 2 | .7 | 15 |
| D176505 | 15 | 1 | 5 | 20 L | 3 | 5 | 150 | 50 | 5 | .7 | 30 |
| D176506 | N | 2 | 1.5 L | B | 3 | 2 | 100 | 20 | 2 | .3 | 10 |
| D176507 | 7 L | N | 1.5 L | N | 2 | 2 | 200 | 15 | 2 | .5 | 10 |
| D176508 | N | 2 | 1.5 | B | 2 | 1.5 | 100 | 15 | 2 | .2 | 15 |
| D176509 | N | 1 | 1 L | B | 1.5 | 1 | 100 | 10 | 1.5 | .15 | 10 |
| D176510 | N | 1 | 1.5 L | B | 2 | 2 | 150 | 10 | 2 | .2 | 10 |
| D176511 | N | .5 | 1.5 L | B | 2 | 1.5 | 100 | 10 | 2 | .2 | 10 |
| D176512 | N | 1 | 1.5 L | B | 2 | 1 | 100 | 10 | 2 | .2 | 10 |
| D176513 | 7 L | 1.5 | 1.5 L | N | 3 | 1 | 150 | 10 | 2 | .2 | 10 |
| D176514 | N | 3 | 1.5 L | B | 5 | 1 | 100 | 10 | 3 | .2 | 10 |
| D176515 | 20 | 5 | 7 | 50 L | 7 | 7 | 500 | 150 | 15 | 1.5 | 50 |
| D176516 | 30 L | 5 | 10 | 50 L | 10 | 10 | 100 | 100 | 20 | 2 | 70 |

Table 8g.--Major, minor, and trace element composition of 7 samples from Anderson coal bed, USGS core hole RM-4 SW 1/4 SW 1/4 Sec. 25, T. 56 N., R. 73 W., Campbell County, Wyoming reported on a whole coal basis

[Values are in either percent or parts per million, Si, Al, Ca, Mg, Na, K, Fe, Mn, Ti, P, Cl, Cd, Cu, Li, Pb, and Zn values were calculated from analysis of ash. As, F, Hg, Sb, Se, Th, and U values are from direct determinations on air-dried (32°C) coal. The remaining analyses were calculated from spectrographic determinations on ash. L, less than value shown; N, not detected; B, not determined.]

| SAMPLE | DEPTH | Si % | Al % | Ca % | Mg % | Na % | K % | Fe % | Mn ppm | Ti % | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176799 | 129.4 - 130.0 | 0.92 | 0.37 | 1.1 | 0.326 | 0.160 | 0.027 | 0.24 | 31 L | 0.046 | 350 L |
| D176800 | 130.0 - 136.4 | .65 | .49 | 1.1 | .347 | .164 | .028 | .25 | 29 L | .039 | 320 L |
| D176801 | 136.4 - 143.0 | .69 | .60 | 1.1 | .328 | .166 | .010 | .23 | 31 L | .075 | 340 L |
| D176802 | 143.0 - 148.9 | .62 | .49 | 1.1 | .326 | .157 | .009 | .22 | 27 L | .053 | 300 L |
| D176803 | 148.9 - 156.7 | .65 | .45 | 1.1 | .328 | .164 | .009 | .20 | 27 L | .072 | 300 L |
| D176804 | 156.7 - 163.0 | .050 | .37 | 1.0 | .311 | .165 | .007 | .18 | 25 L | .033 | 5700 |
| D176805 | 163.0 - 167.0 | 4.0 | 2.6 | .83 | .379 | .141 | .17 | .48 | 79 L | .13 | 890 L |

| SAMPLE | Cl % | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D176799 | 0.016 L | 3 | 0.08 L | 4.4 | 25 | 0.02 | 0.8 L | 2.0 | 0.8 | 0.8 |
| D176800 | .015 L | 1 | .07 | 8.2 | 40 | .03 | .9 | 2.6 | .1 | 1.1 |
| D176801 | .016 L | 1 | .08 L | 17.0 | 45 | .08 | 3.2 | 3.6 | .2 | 1.4 |
| D176802 | .014 L | 1 | .07 | 10.8 | 30 | .05 | 2.3 | 2.4 | .1 L | .8 |
| D176803 | .014 L | 1 | .07 | 14.6 | 50 | .23 | 1.4 | 2.4 | .1 L | 1.2 |
| D176804 | .013 L | 1 | .07 L | 6.6 | 40 | .08 | .7 L | 1.6 | .1 L | .7 |
| D176805 | .041 L | 4 | .20 L | 23.9 | 100 | .07 | 10.0 | 6.1 | .8 | 2.1 |

| SAMPLE | Th ppm | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Ce ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-s |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176799 | 3.0 L | 0.9 | 7.8 | 50 | 200 | 1.5 | N | 1 | 7 | B | 2 |
| D176800 | 3.0 L | .5 | 8.6 | 50 | 300 | N | N | 1 | 5 | 1.5 | N |
| D176801 | 9.5 | .4 | 10.1 | 50 | 500 | N | N | 1 | 5 | 2 | N |
| D176802 | 3.0 L | .2 | 4.0 | 50 | 300 | N | N | 1 | 2 | 1 | N |
| D176803 | 3.0 L | .2 | 10.6 | 30 | 300 | N | N | 1 | 2 | 1 | N |
| D176804 | 2.2 | .2 | 9.0 | 50 | 500 | N | N | 1 | 2 | 1 | N |
| D176805 | 15.1 | 2.8 | 55.3 | 50 | 300 | 1.5 | 100 L | 3 | 20 | 7 | N |

| SAMPLE | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-B | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176799 | N | 1 | 5 | B | 2 | 5 | 50 | 50 | 10 | 1 | 20 |
| D176800 | N | 1 | 1.5 L | B | 2 | 1 | 50 | 10 | 2 | .2 | 10 |
| D176801 | 7 L | 1 | 2 | N | 2 | 1.5 | 50 | 20 | 2 | .2 | 15 |
| D176802 | N | N | 1.5 | B | 1.5 | 1.5 | 50 | 10 | 2 | .2 | 10 |
| D176803 | N | N | 2 | B | 1.5 | 1 | 50 | 15 | 2 | .2 | 15 |
| D176804 | 7 L | 1 | 1.5 | N | 2 | 1 | 50 | 7 | 2 | .2 | 10 |
| D176805 | 20 L | 3 | 7 | N | 7 | 5 | 100 | 100 | 15 | 1 | 30 |

Table 8h.—Major, minor, and trace element composition of 7 samples from Canyon A coal bed, USGS core hole RM-4 SW 1/4 SW 1/4 Sec. 25, T. 56 N., R. 73 W., Campbell County, Wyoming reported on a whole coal basis

[Values are in either percent or parts per million, Si, Al, Ca, Mg, Na, K, Fe, Mn, Ti, P, Cl, Cd, Cu, Li, Pb, and Zn values were calculated from analysis of ash. As, F, Hg, Sb, Se, Th, and U values are from direct determinations on air-dried (32°C) coal. The remaining analyses were calculated from spectrographic determinations on ash. L, less than value shown; N, not detected; B, not determined.]

| SAMPLE | DEPTH | Si % | Al % | Ca % | Mg % | Na % | K % | Fe % | Mn ppm | Ti % | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176806 | 298.0 - 299.0 | .39 | .48 | .88 | .291 | .140 | .018 | 2.2 | 42 L | .028 | 640 |
| D176807 | 299.0 - 303.0 | 1.8 | .52 | 1.0 | .301 | .148 | .024 | .22 | 42 L | .13 | 470 L |
| D176808 | 305.0 - 306.0 | 1.9 | .62 | .84 | .263 | .151 | .066 | .47 | 40 L | .057 | 450 L |
| D176809 | 306.0 - 308.4 | .18 | .39 | .97 | .294 | .171 | .010 | .19 | 23 L | .028 | 310 |
| D176810 | 308.4 - 312.0 | .31 | .31 | .93 | .290 | .168 | .009 | .43 | 43 | .033 | 270 L |
| D176811 | 312.0 - 316.0 | .58 | .37 | .88 | .277 | .157 | .011 | .19 | 23 L | .034 | 260 L |
| D176812 | 316.0 - 320.5 | .46 | .39 | .87 | .273 | .161 | .015 | .20 | 22 L | .034 | 250 L |

| SAMPLE | Cl % | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D176806 | .022 L | 20 | .16 | 6.6 | 40 | .34 | 1.1 L | 2.7 L | 1.5 | 2.4 |
| D176807 | .022 L | 3 | .11 L | 13.1 | 65 | .09 | 1.2 | 3.2 | .3 | .8 |
| D176808 | .021 L | 2 | .10 L | 7.1 | 70 | .09 | 1.0 | 2.6 L | .6 | 1.1 |
| D176809 | .012 L | 1 | .06 L | 3.5 | 65 | .04 | .6 L | 1.5 | .1 L | .7 |
| D176810 | .012 L | 1 | .06 L | 6.6 | 40 | .08 | .6 L | 1.6 L | .1 L | .6 |
| D176811 | .012 L | 1 | .06 L | 7.4 | 55 | .03 | .6 L | 2.1 | .2 | .4 |
| D176812 | .011 L | 1 | .06 L | 9.1 | 55 | .03 | .6 | 3.1 | .3 | .5 |

| SAMPLE | Th ppm | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Ce ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176806 | 3.9 | 1.3 | 40.8 | 30 | 300 | 3 | 50 L | 7 | 5 | B | 7 |
| D176807 | 3.0 L | 1.3 | 40.8 | 30 | 300 | 3 | 50 L | 1 | 5 | 2 | N |
| D176808 | 7.1 | .8 | 41.4 | 30 | 300 | 1 | 50 L | 2 | 7 | 7 | N |
| D176809 | 2.7 | .3 | 5.0 | 50 | 500 | .5 | N | 1.5 | 1.5 | 1 | N |
| D176810 | 2.3 | .2 | 9.0 | 50 | 300 | N | N | 1 | 2 | 1 | N |
| D176811 | 5.8 | .3 | 8.7 | 50 | 500 | .5 | N | 1 | 1.5 | 1 | N |
| D176812 | 3.0 L | .8 | 8.9 | 50 | 500 | .7 | 30 L | 1 | 10 | 1.5 | N |

| SAMPLE | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-B | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176806 | 10 L | 7 | 3 | N | 30 | 10 | 70 | 70 | 15 | B | 100 |
| D176807 | 10 L | 1.5 | 3 | N | 3 | 1.5 | 70 | 15 | 7 | .7 | 20 |
| D176808 | 10 L | .7 | 5 | N | 5 | 3 | 70 | 15 | 7 | .7 | 30 |
| D176809 | 7 L | .5 | 1 L | N | 5 | 1 | 100 | 7 | 5 | .5 | 7 |
| D176810 | N | .5 | 1.5 | B | 3 | 1 | 50 | 7 | 2 | .3 | 10 |
| D176811 | 7 L | .5 | 1.5 | N | 1.5 | 1 | 70 | 10 | 5 | .5 | 10 |
| D176812 | 10 | 1 | 1.5 | 10 | 1.5 | 1.5 | 70 | 15 | 7 | .5 | 10 |

Table 8i.—Major, minor, and trace element composition of 7 samples from Canyon B coal bed, USGS core hole RM-4 SW 1/4 SW 1/4 Sec. 25, T. 56 N., R. 73 W., Campbell County, Wyoming reported on a whole coal basis

[Values are in either percent or parts per million, Si, Al, Ca, Mg, Na, K, Fe, Mn, Ti, P, Cl, Cd, Cu, Li, Pb, and Zn values were calculated from analysis of ash. As, F, Hg, Sb, Se, Th, and U values are from direct determinations on air-dried (32°C) coal. The remaining analyses were calculated from spectrographic determinations on ash. L, less than value shown; N, not detected; B, not determined.]

| SAMPLE | DEPTH | Si % | Al % | Ca % | Mg % | Na % | K % | Fe % | Mn ppm | Ti % | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176813 | 323.0 - 327.0 | 1.5 | .74 | .90 | .297 | .140 | .037 | .25 | 34 L | .043 | 380 L |
| D176814 | 327.0 - 332.3 | .22 | .30 | .89 | .275 | .155 | .008 | .40 | 80 | .018 | 230 L |
| D176815 | 332.3 - 335.3 | .36 | .25 | .87 | .302 | .141 | .010 | .97 | 180 | .015 | 280 L |
| D176816 | 335.3 - 338.4 | .37 | .16 | .81 | .284 | .148 | .008 | .74 | 140 | .016 | 250 L |
| D176817 | 338.4 - 342.0 | .14 | .25 | .84 | .252 | .152 | .008 | .15 | 17 L | .013 | 190 L |
| D176818 | 342.0 - 346.0 | .81 | .76 | .80 | .250 | .142 | .025 | .27 | 30 L | .046 | 340 L |
| D176819 | 346.0 - 349.0 | 2.1 | 1.1 | .83 | .264 | .135 | .054 | .24 | 45 L | .077 | 510 L |

| SAMPLE | Cl % | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D176813 | .018 L | 2 | .09 L | 7.5 | 40 | .04 | 2.3 | 4.0 | .2 | .9 |
| D176814 | .011 L | 1 | .05 L | 1.5 | 45 | .03 | .5 L | 1.6 | .2 | .7 |
| D176815 | .013 L | 1 | .06 L | 2.9 | 40 | .02 | .6 L | 1.6 L | .2 | .5 |
| D176816 | .012 L | 1 | .06 L | 1.9 | 25 | .02 | .6 L | 1.4 L | .2 | .6 |
| D176817 | .009 L | 1 | .04 L | 2.3 | 25 | .01 L | .4 L | 1.3 | .1 L | .4 |
| D176818 | .016 L | 3 | .08 L | 9.4 | 70 | .03 | 2.9 | 1.9 L | .4 | 1.2 |
| D176819 | .023 L | 2 | .12 L | 16.8 | 80 | .06 | 4.6 | 2.9 | .4 | .9 |

| SAMPLE | Th ppm | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Ce ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176813 | 2.8 | 1.0 | 29.8 | 50 | 300 | 1.5 | 50 L | 3 | 5 | 1.5 | N |
| D176814 | 4.6 | .2 L | 7.5 | 30 | 300 | N | N | .5 | .7 | .7 | N |
| D176815 | 4.8 | .8 | 13.9 | 50 | 200 | .2 | N | 1 | 1 | 1 | N |
| D176816 | 3.0 L | .2 L | 3.8 | 30 | 300 | N | N | .7 L | 1 | .7 | N |
| D176817 | 3.0 L | .2 L | 3.2 | 30 | 300 | N | N | .7 | .7 | .5 | N |
| D176818 | 7.8 | 1.3 | 5.8 | 50 | 200 | .2 | 50 | 1.5 | 5 | 2 | N |
| D176819 | 4.8 | 1.4 | 33.7 | 30 | 300 | .7 | 70 L | 1.5 | 7 | 2 | N |

| SAMPLE | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-B | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176813 | 10 L | 1 | 1.5 | N | 3 | 1.5 | 50 | 15 | 10 | .7 | 15 |
| D176814 | N | .3 | 1.5 | B | 1 | .5 L | 50 | 3 | 1 | .15 | 7 |
| D176815 | N | .5 | 1.5 L | B | 2 | .7 | 50 | 3 | 2 | .5 | 5 |
| D176816 | N | .5 | 1 L | B | 1.5 | .7 L | 50 | 1.5 | 1 L | .10 L | 5 |
| D176817 | N | .3 | 1 L | B | 2 | .5 | 30 | 3 | 1.5 | 15 | 3 |
| D176818 | 10 | .7 | 2 | 15 | 5 | 1 | 50 | 15 | 5 | .5 | 10 |
| D176819 | 10 L | .7 | 2 | N | 7 | 2 | 70 | 20 | 7 | .7 | 15 |

Table 8j.—Major, minor, and trace element composition of 6 samples from Anderson coal bed, USGS core hole RM-5 SE 1/4 SE 1/4 Sec. 27, T. 56 N., R. 73 W., Campbell County, Wyoming reported on a whole coal basis

[Values are in either percent or parts per million, Si, Al, Ca, Mg, Na, K, Fe, Mn, Ti, P, Cl, Cd, Cu, Li, Pb, and Zn values were calculated from snalysis of ash. As, F, Hg, Sb, Se, Th, and U values are from direct determinations on air-dried (32°C) coal. The remaining analyses were calculated from spectrographic determinations on ash. L, less than value shown; N, not detected; B, not determined.]

| SAMPLE | DEPTH | Si % | Al % | Ca % | Mg % | Na % | K % | Fe % | Mn ppm | Ti % | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177715 | 135.2 - 136.2 | 4.1 | 0.75 | 1.0 | 0.280 | 0.144 | 0.14 | 0.51 | 67 L | 0.050 | 750 L |
| D177716 | 136.2 - 140.0 | 1.4 | .54 | 1.0 | .257 | .159 | .055 | .18 | 40 | .036 | 400 L |
| D177717 | 140.0 - 149.0 | .26 | .16 | .18 | .043 | .023 | .005 | .040 | 7.0 L | .014 | 79 L |
| D177718 | 149.0 - 157.2 | .86 | .44 | 1.2 | .284 | .158 | .009 | .17 | 38 | .054 | 340 L |
| D177719 | 157.2 - 165.6 | .54 | .36 | 1.1 | .284 | .168 | .009 | .23 | 38 | .035 | 310 L |
| D177720 | 165.6 - 168.6 | 4.3 | 2.4 | 1.0 | .326 | .168 | .16 | .39 | 84 L | .12 | 940 L |

| SAMPLE | Cl % | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D177715 | 0.034 L | 5.0 | 0.17 L | 8.9 | 65 | 0.23 | 3.1 | 4.3 | 0.7 | 0.8 |
| D177716 | .018 L | 1.0 | .09 L | 7.7 | 40 | .04 | 1.4 | 2.3 L | .2 | .8 |
| D177717 | .004 L | 4.0 | .02 L | 3.3 | 60 | .13 | 1.7 | .7 | .2 | 1.4 |
| D177718 | .016 L | .5 | .08 L | 10.9 | 55 | .06 | 3.4 | 1.9 | .1 L | .9 |
| D177719 | .014 L | 1.0 | .07 L | 6.8 | 20 | .09 | 1.2 | 1.8 | .1 L | .7 |
| D177720 | .043 L | 2.0 | .22 | 31.8 | 130 | .17 | 15.6 | 9.7 | 1.6 | 2.3 |

| SAMPLE | Th ppm | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177715 | 3.0 L | 1.9 | 19.8 | 100 | 300 | 2 | 2 | 10 | 10 | N |
| D177716 | 3.0 L | .7 | 5.2 | 100 | 300 | N | 1.5 | 7 | 3 | N |
| D177717 | 3.0 L | 1.6 | 1.1 | 15 | 100 | N | .3 | 1.5 | .5 | N |
| D177718 | 3.0 L | .2 L | 2.8 | 70 | 500 | N | .7 | 5 | 2 | N |
| D177719 | 3.0 L | .2 L | 2.7 | 70500 | | N | .7 | 3 | 2 | N |
| D177720 | 13.6 | 7.6 | 36.5 | 70 | 700 | 2 | 2 | 50 | 15 | 5 |

| SAMPLE | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-B | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177715 | N | 2 | 5 | B | 5 | 3 | 100 | 50 | 10 | 1 | 30 |
| D177716 | N | 1 | N | B | 2 | 1.5 | 100 | 20 | 5 | .5 | 15 |
| D177717 | 2 L | .2 | .3 | N | 1 | .3 | 20 | 5 | 1 | .10 | 3 |
| D177718 | N | .5 | 1.5 | B | 1 | 1.5 | 150 | 15 | 5 | .5 | 10 |
| D177719 | N | 1 | N | B | 1.5 | 1 | 150 | 10 | 2 | .2 | 7 |
| D177720 | 30 | 10 | 7 | 30 | 7 | 7 | 100 | 100 | 30 | 3 | 30 |

Table 8k.--Major, minor, and trace element composition of 9 samples from Canyon coal bed, USGS core hole RM-5 SE 1/4 SE 1/4 Sec. 27, T. 56 N., R. 73 W., Campbell County, Wyoming reported on a whole coal basis

[Values are in either percent or parts per million, Si, Al, Ca, Mg, Na, K, Fe, Mn, Ti, P, Cl, Cd, Cu, Li, Pb, and Zn values were calculated from analysis of ash. As, F, Hg, Sb, Se, Th, and U values are from direct determinations on air-dried (32°C) coal. The remaining analyses were calculated from spectrographic determinations on ash. L, less than value shown; N, not detected; B, not determined.]

| SAMPLE | DEPTH | Si % | Al % | Ca % | Mg % | Na % | K % | Fe % | Mn ppm | Ti % | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177721 | 354.9 - 356.4 | 0.33 | 0.30 | 1.0 | 0.272 | 0.152 | 0.007 | 0.85 | 62 | 0.021 | 406 L |
| D177722 | 356.5 - 360.2 | 1.1 | .43 | 1.1 | .304 | .155 | .010 | .16 | 62 | .076 | 399 |
| D177723 | 360.2 - 361.8 | 28 | 3.6 | .42 | .276 | .106 | .87 | .35 | 274 L | .29 | 3085 L |
| D177724 | 361.8 - 370.7 | .37 | .32 | .97 | .274 | .151 | .007 | .19 | 39 | .024 | 391 |
| D177725 | 371.1 - 374.8 | 1.9 | .80 | 1.0 | .293 | .148 | .068 | .17 | 54 | .064 | 454 L |
| D177726 | 374.8 - 375.9 | 3.7 | 1.4 | .073 | .085 | .025 | .18 | .17 | 51 L | .055 | 572 L |
| D177727 | 375.9 - 384.3 | .34 | .29 | 1.1 | .304 | .139 | .008 | .18 | 63 | .017 | 276 |
| D177728 | 384.3 - 392.2 | .24 | .30 | 1.0 | .278 | .145 | .007 | .35 | 79 | .017 | 453 |
| D177729 | ——— | 3.8 | 2.4 | .90 | .317 | .137 | .12 | .60 | 104 | .10 | 882 |

| SAMPLE | Cl % | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D177721 | 0.019 L | 18 | 0.09 L | 6.0 | 20 L | 0.30 | 0.9 | 2.3 L | 0.8 | 0.7 |
| D177722 | .018 L | 2 | .09 L | 13.0 | 20 | .06 | 2.2 | 3.1 | .2 | 1.0 |
| D177723 | .14 L | 4 | .71 L | 21.9 | 220 | .06 | 21.9 | 17.7 L | .5 | 1.0 |
| D177724 | .012 L | 2 | .06 L | 7.7 | 20 L | .06 | .8 | 1.8 | .1 L | .6 |
| D177725 | .021 L | 1 | .10 L | 15.0 | 65 | .04 | 3.5 | 3.1 | .3 | .5 |
| D177726 | .026 L | 6 | .13 L | 6.0 | 433 | .32 | 8.5 | 3.9 | .7 | 1.8 |
| D177727 | .012 L | 1 | .06 L | 3.1 | 25 | .03 | .8 | 1.5 | .2 | .3 |
| D177728 | .012 L | 2 | .06 L | 2.8 | 20 L | .03 | .6 L | 1.5 L | .2 | .5 |
| D177729 | .040 L | 6 | .20 L | 24.4 | 100 | .25 | 15.1 | 9.1 | .7 | 1.1 |

| SAMPLE | Th ppm | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177721 | 3.0 L | 0.7 | 6.0 | 70 | 500 | 2 | N | 1.5 | 3 | N |
| D177722 | 3.0 L | .6 | 3.9 | 70 | 700 | N | 1 | 7 | 3 | N |
| D177723 | 3.0 L | 5.1 | 20.5 | 70 | 500 | N | 7 L | 50 | 15 | N |
| D177724 | 3.0 L | .4 | 2.4 | 70 | 700 | .2 | 1.5 | 3 | 1.5 | N |
| D177725 | 3.0 L | 1.2 | 4.6 | 70 | 700 | .5 | 1.5 | 10 | 5 | N |
| D177726 | 15.8 | 4.9 | 24.8 | 15 | 100 | N | 3 | 15 | 7 | N |
| D177727 | 3.0 L | .3 | 4.4 | 70 | 700 | .15 | 1 | 1.5 | 1.5 | N |
| D177728 | 3.0 L | .4 | 3.7 | 70 | 1000 | N | .7 | 2 | 1 | N |
| D177729 | 3.0 L | 2.9 | 25.9 | 70 | 500 | .7 | 7 | 20 | 15 | N |

| SAMPLE | La ppm-S | Mo ppm-S | Nb ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-B | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177721 | 10 L | 3 | N | 5 | 1.5 | 70 | 7 | 10 | 1 | 7 |
| D177722 | 10 L | .7 | 3 | 3 | 1.5 | 150 | 20 | 7 | .7 | 15 |
| D177723 | N | N | 20 | 7 L | 7 | 150 | 70 | 20 | 3 | 200 |
| D177724 | N | .7 | N | 2 | 1 | 200 | 10 | 3 | .3 | 10 |
| D177725 | 10 L | .7 | 3 | 2 | 3 | 100 | 30 | 7 | .7 | 15 |
| D177726 | N | N | 5 | 7 | 2 | 50 | 50 | 5 | .5 | 20 |
| D177727 | 7 L | .5 | 1 | 1.5 | .7 | 100 | 5 | 3 | .3 | 5 |
| D177728 | 7 | .7 | N | 2 | .7 | 200 | 7 | 3 | .3 | 5 |
| D177729 | 20 L | 3 | 7 | 20 | 3 | 100 | 70 | 15 | 1.5 | 30 |

Table 81.—Major, minor, and trace element composition of 5 samples from Anderson coal bed, USGS core hole RM-6 NW 1/4 NW 1/4 Sec. 21, T. 56 N., R. 73 W., Campbell County, Wyoming reported on a whole coal basis

[Values are in either percent or parts per million, Si, Al, Ca, Mg, Na, K, Fe, Mn, Ti, P, Cl, Cd, Cu, Li, Pb, and Zn values were calculated from analysis of ash. As, F, Hg, Sb, Se, Th, and U values are from direct determinations on air-dried (32°C) coal. The remaining analyses were calculated from spectrographic determinations on ash. L, less than value shown; N, not detected; B, not determined.]

| SAMPLE | DEPTH | Si % | Al % | Ca % | Mg % | Na % | K % | Fe % | Mn ppm | Ti % | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177730 | 88.9 - 90.4 | 1.5 | 0.70 | 1.0 | 0.238 | 0.153 | 0.071 | 0.18 | 48 | 0.042 | 420 L |
| D177731 | 90.4 - 97.7 | 1.6 | 1.1 | 1.2 | .280 | .168 | .052 | .28 | 56 | .062 | 510 L |
| D177732 | 97.7 - 107.4 | 2.0 | 1.3 | 1.2 | .292 | .165 | .043 | .41 | 68 | .11 | 590 L |
| D177733 | 107.4 - 116.9 | 1.2 | .86 | 2.5 | .588 | .377 | .013 | .42 | 95 | .069 | 670 L |
| D177734 | 116.9 - 120.0 | 1.7 | 1.1 | 1.1 | .299 | .181 | .064 | .22 | 56 | .079 | 520 L |

| SAMPLE | Cl % | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D177730 | 0.019 L | 1.5 | 0.10 L | 6.7 | 30 | 0.30 | 2.2 | 2.4 | 0.4 | 0.8 |
| D177731 | .023 L | 2.0 | .12 L | 15.7 | 60 | .08 | 5.5 | 4.6 | .5 | 1.6 |
| D177732 | .027 L | 5.0 | .14 L | 35.1 | 65 | .24 | 12.8 | 4.7 | .3 | 2.2 |
| D177733 | .031 L | 1.0 | .15 L | 18.2 | 20 | .05 | 4.3 | 3.8 | .1 | .7 |
| D177734 | .024 L | 1.0 | .12 L | 19.2 | 75 | .04 | 4.3 | 4.8 | .3 | 2.0 |

| SAMPLE | Th ppm | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177730 | 3.0 L | 1.2 | 8.6 | 100 | 500 | 1.5 | 1.5 | 10 | 7 | N |
| D177731 | 3.0 L | 2.2 | 4.9 | 70 | 700 | N | 1.5 | 15 | 7 | N |
| D177732 | 3.0 L | 1.9 | 27.9 | 70 | 700 | N | 2 | 15 | 7 | N |
| D177733 | 3.0 L | .2 L | 4.9 | 150 | 1000 | N | 1.5 | 7 | 5 | N |
| D177734 | 3.0 L | 1.2 | 4.3 | 70 | 700 | .3 | 1 | 20 | 10 | N |

| SAMPLE | La ppm-S | Mo ppm-S | Nb ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-B | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177730 | N | 5 | 2 | 3 | 3 | 100 | 30 | 10 | 1 | 15 |
| D177731 | 10 L | 1.5 | 2 | 3 | 3 | 100 | 30 | 7 | .7 | 15 |
| D177732 | 15 L | 2 | 5 | 7 | 5 | 150 | 50 | 10 | 1 | 20 |
| D177733 | N | 1 | 3 | 2 | 3 | 200 | 20 | 5 | .5 | 15 |
| D177734 | 10 L | 2 | 3 | 2 | 2 | 100 | 70 | 10 | 1 | 20 |

Table 8m.--Major, minor, and trace element composition of 6 samples from Canyon coal bed, USGS core hole RM-6 NW 1/4 NE 1/4 Sec. 21, T. 56 N., R. 73 W., Campbell County, Wyoming reported on a whole coal basis

[Values are in either percent or parts per million, Si, Al, Ca, Mg, Na, K, Fe, Mn, Ti, P, Cl, Cd, Cu, Li, Pb, and Zn values were calculated from analysis of ash. As, F, Hg, Sb, Se, Th, and U values are from direct determinations on air-dried (32°C) coal. The remaining analyses were calculated from spectrographic determinations on ash. L, less than value shown; N, not detected; B, not determined.]

| SAMPLE | DEPTH | Si % | Al % | Ca % | Mg % | Na % | K % | Fe % | Mn ppm | Ti % | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177735 | 256.5 - 257.2 | 5.6 | 2.1 | 1.0 | 0.476 | 0.152 | 0.56 | 0.62 | 133 | 0.10 | 1034 L |
| D177736 | 257.2 - 261.2 | 1.5 | 1.3 | 1.0 | .264 | .157 | .071 | .23 | 63 | .053 | 471 L |
| D177737 | 272.1 - 272.7 | 10 | 5.1 | .83 | .514 | .164 | .56 | 1.7 | 241 | .18 | 1933 L |
| D177738 | 272.7 - 285.2 | 3.1 | 1.8 | 1.0 | .310 | .154 | .13 | .44 | 88 | .087 | 681 L |
| D177739 | 285.2 - 297.9 | .56 | .27 | 1.2 | .283 | .148 | .010 | .37 | 105 | .023 | 321 |
| D177740 | 297.9 - 302.7 | .40 | .24 | 1.1 | .262 | .150 | .010 | .18 | 61 | --- | 282 |

| SAMPLE | Cl % | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D177735 | 0.047 L | 9 | 0.24 L | 27.3 | 215 | 0.07 | 11.1 | 11.9 | 2.1 | 0.9 |
| D177736 | .022 L | 3 | .11 L | 11.9 | 70 | .05 | 5.7 | 4.3 | .3 | .8 |
| D177737 | .089 L | 145 | .44 L | 37.7 | 365 | .33 | 29.2 | 15.5 | 1.0 | 3.2 |
| D177738 | .031 L | 2 | .16 L | 19.0 | 90 | .12 | 10.1 | 6.2 | .3 | 1.8 |
| D177739 | .014 L | 1 | .07 L | 3.1 | 50 | .04 | .7 | 1.7 L | .2 | .9 |
| D177740 | .012 L | 1 | .06 L | 3.6 | 25 | .03 | .6 L | 1.5 | .2 | .7 |

| SAMPLE | Th ppm | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177735 | 3.0 L | 3.7 | 49.1 | 70 | 700 | 5 | 10 | 30 | 15 | 20 |
| D177736 | 3.0 L | 1.4 | 4.1 | 70 | 500 | 1.5 | 2 | 15 | 5 | N |
| D177737 | 3.0 L | 6.3 | 105 | 70 | 500 | 7 | 15 | 70 | 20 | N |
| D177738 | 4.8 | 1.3 | 26.1 | 70 | 500 | .5 | 2 | 15 | 5 | N |
| D177739 | 3.0 L | .4 | 2.6 | 70 | 500 | N | N | 2 | 1 | N |
| D177740 | 3.0 L | .7 | 2.5 | 70 | 700 | .3 | .7 | 5 | 1 | N |

| SAMPLE | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-B | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177735 | 20 L | 3 | 7 | 30 | 20 | 7 | 500 | 70 | 30 | 3 | 30 |
| D177736 | 10 L | 1 | 2 | N | 5 | 2 | 100 | 30 | 7 | .7 | 15 |
| D177737 | N | 7 | 10 | B | 30 | 10 | 200 | 150 | 30 | 3 | 70 |
| D177738 | 15 L | 1 | 3 | N | 7 | 3 | 200 | 50 | 7 | 1 | 20 |
| D177739 | N | .5 | N | B | 1 | .7 L | 150 | 5 | 2 | .2 | 10 |
| D177740 | 7 | 7 | 1 | N | 3 | 1 | 100 | 10 | 5 | .5 | 7 |

Table 8n.--Major, minor, and trace element composition of 5 samples from Anderson coal bed, USGS core hole RM-7 NE 1/4 NW 1/4 Sec. 26, T. 55 N., R. 73 W., Campbell County, Wyoming reported on a whole coal basis

[Values are in either percent or parts per million, Si, Al, Ca, Mg, Na, K, Fe, Mn, Ti, P, Cl, Cd, Cu, Li, Pb, and Zn values were calculated from analysis of ash. As, F, Hg, Sb, Se, Th, and U valuea are from direct determinations on air-dried (32°C) coal. The remaining analyses were calculated from spectrographic determinations on ash. L, less than value shown; N, not detected; B, not determined.]

| SAMPLE | DEPTH | Si % | Al % | Ca % | Mg % | Na % | K % | Fe % | Mn ppm | Ti % | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177741 | 133.2 - 134.0 | 0.92 | 0.47 | 1.0 | 0.285 | 0.155 | 0.032 | 0.17 | 31 | 0.028 | 320 L |
| D177742 | 134.0 - 141.0 | .72 | .37 | 1.1 | .290 | .139 | .015 | .20 | 26 L | .029 | 300 L |
| D177743 | 141.0 - 154.0 | .88 | .47 | 1.1 | .305 | .141 | .011 | .17 | 29 L | .070 | 330 L |
| D177744 | 154.0 - 161.9 | .57 | .41 | 1.1 | .312 | .160 | .009 | .17 | 26 L | .028 | 290 L |
| D177745 | 161.9 - 170.3 | .76 | .65 | .95 | .290 | .156 | .026 | .23 | 29 L | .028 | 330 L |

| SAMPLE | Cl % | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D177741 | 0.015 L | 1.0 | 0.07 L | 11.2 | 40 | 0.03 | 1.1 | 2.2 | 0.9 | 1.8 |
| D177742 | .014 L | .5 | .07 L | 6.3 | 35 | .05 | .8 | 1.7 | .1 L | 1.0 |
| D177743 | .015 L | .5 | .08 L | 16.8 | 50 | .09 | 2.4 | 2.3 | .2 | 1.1 |
| D177744 | .013 L | .5 | .07 L | 6.6 | 70 | .07 | 2.0 | 1.7 | .1 L | 1.1 |
| D177745 | .015 L | 1.0 | .07 | 10.6 | 50 | .05 | 3.5 | 3.8 | .5 | 1.1 |

| SAMPLE | Th ppm | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177741 | 3.0 L | .07 | 5.6 | 70 | 300 | 3 | 1 | 10 | 10 | 3 |
| D177742 | 3.0 L | .2 L | 2.0 | 70 | 500 | .5 | .7 | 3 | 1.5 | N |
| D177743 | 3.0 L | .6 | 3.7 | 50 | 500 | N | .7 | 5 | 2 | N |
| D177744 | 3.0 L | .2 L | 3.8 | 50 | 500 | N | 1 | 3 | 2 | N |
| D177745 | 3.0 L | 1.8 | 7.6 | 70 | 300 | 1 | 1 | 7 | 3 | N |

| SAMPLE | La ppm-S | Mo ppm-S | Nb ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-B | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177741 | N | 1 | 5 | 1.5 | 7 | 70 | 50 | 10 | 1.5 | 20 |
| D177742 | N | N | N | 1 | 1 | 100 | 10 | 5 | .3 | 7 |
| D177743 | N | N | N | 1 | 1.5 | 70 | 20 | 3 | .3 | 10 |
| D177744 | 7 L | N | N | 1.5 | 2 | 150 | 15 | 2 | .2 | 10 |
| D177745 | 10 | 3 | 1.5 | 2 | 3 | 150 | 30 | 10 | 1 | 10 |

Table 8o.—Major, minor, and trace element composition of 6 samples from Canyon coal bed, USGS core hole RM-7 NE 1/4 NW 1/4 Sec. 26, T. 55 N., R. 73 W., Campbell County, Wyoming reported on a whole coal basis

[Values are in either percent or parts per million, Si, Al, Ca, Mg, Na, K, Fe, Mn, Ti, P, Cl, Cd, Cu, Li, Pb, and Zn values were calculated from analysis of ash. As, F, Hg, Sb, Se, Th, and U values are from direct determinations on air-dried (32°C) coal. The remaining analyses were calculated from spectrographic determinations on ash. L, less than value shown; N, not detected; B, not determined.]

Canyon coal bed 286.2 to 329.6

| SAMPLE | DEPTH | Si % | Al % | Ca % | Mg % | Na % | K % | Fe % | Mn ppm | Ti % | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177746 | 286.2 - 287.3 | 2.4 | 0.98 | 0.77 | 0.304 | 0.115 | 0.20 | 2.5 | 70 L | 0.050 | 790 L |
| D177747 | 287.3 - 297.3 | .74 | .38 | 1.0 | .309 | .125 | .012 | .34 | 29 L | .047 | 380 |
| D177748 | 299.2 - 306.3 | 1.4 | .61 | 2.1 | .621 | .265 | .020 | .34 | 51 L | .062 | 570 L |
| D177749 | 306.3 - 317.7 | .31 | .25 | .99 | .286 | .119 | .007 | .15 | 21 L | .016 | 360 |
| D177750 | 317.7 - 326.0 | .27 | .30 | .89 | .261 | .117 | .008 | .61 | 43 | .018 | 510 |
| D177751 | 326.0 - 329.6 | 3.6 | 2.1 | .84 | .298 | .118 | .12 | .40 | 67 L | .11 | 760 L |

| SAMPLE | Cl % | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D177746 | 0.036 L | 31.0 | 0.18 L | 14.6 | 85 | 0.50 | 4.2 | 4.6 L | 2.9 | 1.6 |
| D177747 | .015 L | 3.5 | .08 L | 8.7 | 45 | .10 | 1.3 | 1.9 | .1 | 1.1 |
| D177748 | .026 L | .5 | .13 L | 14.3 | 20 L | .06 | 2.1 | 3.9 | .1 L | .6 |
| D177749 | .011 L | 1.0 | .05 L | 2.0 | 45 | .04 | .5 L | 1.3 L | .1 L | .6 |
| D177750 | .012 L | 2.5 | .06 L | 3.8 | 35 | .09 | .6 L | 1.5 L | .1 L | .8 |
| D177751 | .035 L | 2.0 | .17 L | 24.0 | 100 | .09 | 10.8 | 7.8 | 1.0 | 1.2 |

| SAMPLE | Th ppm | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Ce ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177746 | 5.9 | 1.6 | 13.6 | 50 | 300 | 5 | N | 3 | 15 | 15 |
| D177747 | 3.0 L | .2 L | 2.0 | 50 | 500 | .2 | N | .7 | 5 | 2 |
| D177748 | 3.0 L | .2 L | 3.5 | 150 | 1000 | N | N | 1.5 | 7 | 5 |
| D177749 | 3.0 L | .2 L | 1.5 | 50 | 500 | N | N | .5 L | 1.5 | 1.5 |
| D177750 | 3.0 L | .2 L | 3.7 | 70 | 700 | N | N | 1 | 3 | 2 |
| D177751 | 7.1 | 3.0 | 14.8 | 50 | 500 | 1.5 | 100 L | 5 | 30 | 15 |

| SAMPLE | Ge ppm-S | La ppm-S | Mo ppm-S | Nb ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-B | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177746 | 20 | N | 5 | 3 | 10 | 5 | 50 | 50 | 15 | 1.5 | 30 |
| D177747 | N | N | N | N | 1.5 | 1 | 100 | 15 | 2 | .2 | 10 |
| D177748 | N | N | N | 3 | 2 | 2 | 200 | 20 | 5 | .5 | 20 |
| D177749 | N | N | N | 1 | .5 | .5 | 150 | 3 | 1.5 | .15 | 7 |
| D177750 | N | 10 | 1 | N | 3 | 1 | 200 | 7 | 3 | .3 | 7 |
| D177751 | N | 15 | 2 | 10 | 10 | 5 | 150 | 150 | 15 | 1.5 | 50 |

Table 8p.—Major, minor, and trace element composition of 2 samples from Cook coal bed, USGS core hole RM-7 NE 1/4 NW 1/4 Sec. 26, T. 55 N., R. 73 W., Campbell County, Wyoming reported on a whole coal basis

[Values are in either percent or parts per million, Si, Al, Ca, Mg, Na, K, Fe, Mn, Ti, P, Cl, Cd, Cu, Li, Pb, and Zn values were calculated from analysis of ash. As, F, Hg, Sb, Se, Th, and U values are from direct determinations on air-dried (32°C) coal. The remaining analyses were calculated from spectrographic determinations on ash. L, less than value shown; N, not detected; B, not determined.]

| SAMPLE | DEPTH | Si % | Al % | Ca % | Mg % | Na % | K % | Fe % | Mn ppm | Ti % | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177752 | 369.6 - 370.8 | 15 | 5.7 | 0.79 | 0.544 | 0.127 | 0.64 | 0.92 | 200 L | 0.27 | 2300 L |
| D177753 | 370.8 - 382.0 | 1.3 | .53 | .99 | .269 | .113 | .028 | .21 | 32 L | .043 | 550 |

| SAMPLE | Cl % | As ppm | Cd ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm |
|---|---|---|---|---|---|---|---|---|---|---|
| D177752 | 0.11 L | 2.5 | 0.53 L | 25.3 | 325 | 0.22 | 21.1 | 13.2 | 0.8 | 1.9 |
| D177753 | .017 L | 1.0 | .08 L | 8.3 | 30 | .06 | 2.0 | 2.1 L | .2 | .8 |

| SAMPLE | Th ppm | U ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | La ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177752 | 15.1 | 3.6 | 60.2 | 70 | 500 | 5 | 5 | 70 | 30 | 50 L |
| D177753 | 3.0 L | 1.0 | 3.8 | 100 | 700 | .7 | 1.5 | 10 | 2 | 10 |

| SAMPLE | Mo ppm-S | Nb ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-B | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|---|---|---|
| D177752 | N | 15 | 10 | 15 | 300 | 150 | 30 | 3 | 100 |
| D177753 | 1.5 | 2 | 2 | 2 | 150 | 15 | 10 | .7 | 15 |

Table 9a.--Major and minor oxide and trace element composition of the laboratory ash of 10 Anderson coal samples from USGS core hole RM-1, SW 1/4 NW 1/4 sec. 33, T. 56 N., R. 72 W., Campbell County, Wyoming

[Values are in either percent or parts per million. The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

| | Anderson coal bed 148.2 to 185.0 feet | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample | Depth (feet) | Ash % | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % |
| D176630 | 148.2 - 149.0 | 11.1 | 42 | 9.8 | 19 | 4.03 | 1.63 | 1.1 | 3.9 | 0.014 | 0.48 |
| D176631 | 149.0 - 157.0 | 6.2 | 13 | 10 | 36 | 6.91 | 2.83 | .45 | 6.1 | .018 | .55 |
| D176632 | 157.0 - 162.0 | 6.3 | 14 | 11 | 33 | 6.56 | 2.83 | .30 | 5.8 | .017 | .78 |
| D176633 | 162.0 - 166.1 | 7.5 | 30 | 11 | 27 | 5.74 | 2.28 | .39 | 4.6 | .011 | 1.4 |
| D176634 | 166.1 - 167.0 | 5.9 | 16 | 12 | 33 | 6.84 | 2.85 | .32 | 5.4 | .016 | .56 |
| D176635 | 167.0 - 172.5 | 6.7 | 19 | 10 | 31 | 6.36 | 2.54 | .30 | 4.6 | .017 | .88 |
| D176636 | 172.5 - 175.0 | 5.2 | 12 | 10 | 33 | 7.05 | 3.43 | .31 | 7.1 | .043 | .56 |
| D176637 | 175.0 - 177.4 | 6.2 | 17 | 18 | 24 | 4.93 | 2.31 | .44 | 5.1 | .023 | .75 |
| D176638 | 177.4 - 181.0 | 16.0 | 38 | 25 | 13 | 2.95 | 1.03 | .66 | 2.9 | .006 | 1.0 |
| D176639 | 181.0 - 185.0 | 20.8 | 43 | 20 | 11 | 2.69 | .76 | .77 | 4.7 | .008 | .95 |

| Sample | $P_2O_5$ % | $SO_3$ % | Cd ppm | Cu ppm | Li ppm | Pb ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D176630 | 0.10 L | 2.2 | 1.0L | 56 | 12 | 25 L | 67 | 300 | 3000 | 3 |
| D176631 | .14 | 5.5 | 1.0L | 126 | 10 L | 25 L | 46 | 700 | 7000 | N |
| D176632 | .29 | 5.0 | 1.0L | 132 | 20 | 25 L | 29 | 500 | 5000 | N |
| D176633 | .20 | 4.7 | 1.0L | 217 | 23 | 25 L | 40 | 300 | 3000 | N |
| D176634 | .10 L | 4.7 | 1.0L | 93 | 14 | 25 L | 56 | 700 | 7000 | N |
| D176635 | .42 | 3.7 | 1.0L | 136 | 20 | 25 L | 41 | 500 | 7000 | N |
| D176636 | .29 | 6.5 | 1.0L | 91 | 10 L | 25 L | 41 | 700 | 7000 | N |
| D176637 | 2.5 | 4.3 | 1.0L | 156 | 67 | 25 L | 21 | 500 | 5000 | 3 |
| D176638 | 1.8 | 3.5 | 1.0L | 131 | 142 | 30 | 104 | 150 | 3000 | 7 |
| D176639 | .81 | 4.2 | 2.0 | 129 | 85 | 25 L | 302 | 200 | 3000 | 10 |

Table 9a.--Major and minor oxide and trace element composition of the laboratory ash of 10 Anderson coal samples from USGS core hole RM-1, SW 1/4 NW 1/4 sec. 33, T. 56 N., R. 72 W., Campbell County, Wyoming--Continued

| Sample | Ce ppm | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176630 | N | 15 | 70 | 20 | N | 100 L | 7 | 20 L | N | 20 | 15 |
| D176631 | N | 20 | 70 | 20 | N | N | 10 | 20 L | B | 30 | 20 |
| D176632 | N | 15 | 30 | 20 | N | 100 L | 7 | 20 L | N | 20 | 20 |
| D176633 | N | 15 | 50 | 20 | N | 100 L | N | 20 L | N | 20 | 20 |
| D176634 | N | 15 | 70 | 15 | N | N | 7 | 20 L | B | 30 | 20 |
| D176635 | 500 L | 15 | 50 | 15 | N | 100 L | 7 | 20 L | N | 30 | 20 |
| D176636 | N | 15 | 70 | 15 | N | 100 L | 15 | 20 L | N | 30 | 20 |
| D176637 | N | 20 | 150 | 30 | N | 100 | 50 | 20 L | N | 70 | 30 |
| D176638 | N | 15 | 150 | 50 | N | 100 L | 15 | 20 | N | 50 | 30 |
| D176639 | 500 L | 20 | 150 | 30 | N | 100 | 30 | 20 | 150 | 70 | 50 |

| Sample | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|
| D176630 | 700 | 150 | 50 | 5 | 150 |
| D176631 | 1500 | 150 | 30 | 3 | 150 |
| D176632 | 1500 | 200 | 30 | 3 | 150 |
| D176633 | 700 | 200 | 30 | 3 | 150 |
| D176634 | 1500 | 150 | 30 | 3 | 150 |
| D176635 | 2000 | 150 | 30 | 3 | 150 |
| D176636 | 2000 | 150 | 30 | 3 | 150 |
| D176637 | 1500 | 300 | 70 | 5 | 150 |
| D176638 | 1000 | 300 | 70 | 5 | 200 |
| D176639 | 700 | 500 | 70 | 7 | 200 |

Table 9b.--Major and minor oxide and trace element composition of the laboratory ash of 6 Anderson coal samples from USGS core hole RM-1, SW 1/4 NW 1/4 sec. 33, T. 56 N., R. 73 W., Campbell County, Wyoming

[Values are in either percent or parts per million. The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

| | | Canyon A coal bed | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample | Depth (feet) | Ash % | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % |
| D176640 | 187.8 - 192.0 | 11.1 | 32 | 16 | 19 | 4.30 | 1.63 | 0.62 | 3.4 | 0.009 | 1.1 |
| D176641 | 195.0 - 198.0 | 5.9 | 16 | 6.7 | 32 | 7.55 | 2.78 | .32 | 5.6 | .037 | .44 |
| D176642 | 198.0 - 202.0 | 5.0 | 5.5 | 6.1 | 28 | 8.58 | 3.04 | .32 | 5.8 | .046 | .32 |
| D176643 | 202.0 - 204.9 | 5.7 | 13 | 11 | 32 | 7.80 | 2.63 | .48 | 5.5 | .013 | .42 |
| D176644 | 204.9 - 207.9 | 7.2 | 19 | 12 | 27 | 6.91 | 2.11 | .36 | 4.1 | .012 | 1.2 |
| D176645 | 207.9 - 210.3 | 12.3 | 39 | 21 | 13 | 3.64 | 1.35 | 1.1 | 4.3 | .006 | .71 |

| Sample | $P_2O_5$ % | $SO_3$ % | Cd ppm | Cu ppm | Li ppm | Pb ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D176640 | 2.3 | 6.5 | 1.0L | 143 | 48 | 25 L | 179 | 300 | 3000 | 3 |
| D176641 | .17 | 9.2 | 1.0L | 76 | 10 L | 25 L | 22 | 700 | 3000 | N |
| D176642 | .16 | 6.1 | 1.0L | 67 | 10 L | 25 L | 27 | 700 | 3000 | N |
| D176643 | 1.1 | 6.1 | 1.0L | 69 | 12 | 25 L | 44 | 700 | 7000 | N |
| D176644 | .95 | 5.3 | 1.0L | 233 | 25 | 30 | 31 | 700 | 3000 | N |
| D176645 | .12 | 5.0 | 1.5 | 148 | 44 | 50 | 181 | 300 | 1000 | 15 |

Table 9b.--Major and minor oxide and trace element composition of the laboratory ash of 6 Anderson coal samples from USGS core hole RM-1, SW 1/4 NW 1/4 sec. 33, T. 56 N., R. 73 W., Campbell County, Wyoming--Continued

| Sample | Ce ppm | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176640 | 500 L | 15 | 100 | 30 | N | 150 | 20 | 20 | 200 | 50 | 30 |
| D176641 | N | 10 | 30 | 10 | N | N | 7 | 20 L | B | 30 | 15 |
| D176642 | N | 15 | 30 | 15 | N | N | 7 | 20 L | N | 30 | 15 |
| D176643 | N | 15 | 30 | 15 | N | N | 7 | 20 L | N | 30 | 20 |
| D176644 | N | 15 | 70 | 20 | 30 | 100 L | 10 | 20 L | N | 30 | 30 |
| D176645 | 500 L | 15 | 100 | 50 | N | 100 L | 15 | 20 | N | 30 | 30 |

| Sample | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|
| D176640 | 1000 | 300 | 100 | 7 | 150 |
| D176641 | 1000 | 70 | 50 | 3 | 150 |
| D176642 | 2000 | 150 | 30 | 3 | 150 |
| D176643 | 2000 | 150 | 50 | 3 | 150 |
| D176644 | 1500 | 300 | 70 | 5 | 150 |
| D176645 | 300 | 300 | 70 | 7 | 150 |

Table 9c.--Major and minor oxide and trace element composition of the laboratory ash of 4 Anderson coal samples from USGS core hole RM-2, SW 1/4 NE 1/4 sec. 32, T. 56 N., R. 72 W., Campbell County, Wyoming

[Values are in either percent or parts per million. The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

Anderson coal bed 198.4 to 185.0 feet

| Sample | Depth (feet) | Ash % | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177704 | 198.4 - 199.1 | 17.6 | 58 | 8.9 | 8.9 | 2.77 | 1.03 | 1.0 | 3.0 | 0.050L | 0.57 |
| D177705 | 199.1 - 208.1 | 8.7 | 31 | 9.9 | 19 | 5.33 | 2.12 | .42 | 3.1 | .050L | 1.2 |
| D177706 | 211.0 - 219.0 | 6.8 | 22 | 9.4 | 23 | 6.76 | 2.74 | .16 | 3.2 | .050L | 1.0 |
| D177707 | 224.9 - 232.6 | 15.6 | 42 | 22 | 8.9 | 3.15 | 1.16 | .83 | 2.4 | .050L | .92 |

| Sample | $P_2O_5$ % | $SO_3$ % | Cl % | Cd ppm | Cu ppm | Li ppm | Pb ppm | Zn ppm | B ppm-S | Ba ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177704 | 1.0 L | 8.4 | 0.20 L | 1.0L | 60 | 15 | 25 L | 114 | 300 | 3000 |
| D177705 | 1.0 L | 11 | .20 L | 1.0L | 189 | 17 | 30 | 52 | 700 | 7000 |
| D177706 | 1.0 L | 11 | .20 L | 1.0L | 144 | 14 | 35 | 47 | 700 | 7000 |
| D177707 | 1.0 L | 6.0 | .20 L | 1.0L | 124 | 49 | 35 | 133 | 300 | 3000 |

| Sample | Be ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177704 | 15 | 15 | 100 | 50 | 20 L | 10 | 50 | N | 30 | 30 |
| D177705 | N | 15 | 50 | 30 | N | 7 | 20 | N | 15 | 20 |
| D177706 | N | 15 | 50 | 30 | N | 7 | N | N | 20 | 20 |
| D177707 | 5 | 15 | 150 | 70 | N | 10 | N | N | 30 | 30 |

| Sample | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|
| D177704 | 700 | 300 | 70 | 15 | 150 |
| D177705 | 1500 | 200 | 50 | 7 | 150 |
| D177706 | 1500 | 200 | 30 | 5 | 150 |
| D177707 | 700 | 300 | 50 | 7 | 150 |

Table 9d.--Major and minor oxide and trace element composition of the laboratory ash of 4 Canyon A coal samples from USGS core hole RM-2, SW 1/4 NE 1/4 sec. 32, T. 56 N., R. 72 W., Campbell County, Wyoming

[Values are in either percent or parts per million. The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

Canyon A coal bed 236.5 to 265.2 feet

| Sample | Depth (feet) | Ash % | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177708 | 236.5 - 243.0 | 26.9 | 51 | 20 | 4.8 | 2.03 | 0.63 | 0.98 | 2.7 | 0.050L | 0.96 |
| D177709 | 243.0 - 246.4 | 21.6 | 42 | 21 | 5.5 | 2.26 | .76 | .39 | 2.2 | .050L | 1.1 |
| D177710 | 249.8 - 256.2 | 5.7 | 11 | 8.3 | 24 | 7.75 | 2.98 | .18 | 6.9 | .070 | .62 |
| D177711 | 258.2 - 265.2 | 6.2 | 21 | 12 | 19 | 6.87 | 2.50 | .25 | 3.2 | .050L | .67 |

| Sample | $P_2O_5$ % | $SO_3$ % | Cl % | Cd ppm | Cu ppm | Li ppm | Pb ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177708 | 1.0 L | 5.7 | 0.20 L | 1.0L | 121 | 60 | 40 | 144 | 200 | 3000 | 7 |
| D177709 | 1.0 L | 6.4 | .20 L | 1.0 | 246 | 127 | 55 | 393 | 200 | 3000 | 7 |
| D177710 | 1.0 L | 18 | .20 L | 1.0L | 100 | 10 L | 25 L | 50 | 1000 | 7000 | N |
| D177711 | 1.0 L | 17 | .20 L | 1.0L | 165 | 16 | 50 | 29 | 1000 | 5000 | 15 |

| Sample | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177708 | 15 | 150 | 50 | N | 100 L | 20 | 20 | N | 50 | 20 |
| D177709 | 15 | 70 | 50 | N | 100 L | 30 | 20 | 150 | 70 | 20 |
| D177710 | 10 | 50 | 20 | N | N | 7 | N | B | 30 | 15 |
| D177711 | 15 | 70 | 30 | N | N | 10 | 20 | B | 50 | 30 |

| Sample | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|
| D177708 | 2000 | 300 | 70 | 7 | 150 |
| D177709 | 2000 | 300 | 70 | 10 | 150 |
| D177710 | 2000 | 150 | 30 | 3 | 100 |
| D177711 | 1500 | 300 | 70 | 7 | 150 |

Table 9e.--Major and minor oxide and trace element composition of the laboratory ash of 3 Canyon B coal samples from USGS core hole RM-2, SW 1/4 NE 1/4 sec. 32, T. 56 N., R. 72 W., Campbell County, Wyoming

[Values are in either percent or parts per million. The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

Canyon B coal bed 311.2 to 330.6 feet

| Sample | Depth (feet) | Ash % | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177712 | 311.2 - 313.0 | 7.3 | 13 | 8.2 | 17 | 7.70 | 1.81 | 0.17 | 6.8 | 0.050L | 0.29 |
| D177713 | 313.0 - 323.0 | 7.1 | 11 | 5.4 | 19 | 7.15 | 2.05 | .12 | 13 | .11 | .35 |
| D177714 | 324.0 - 330.6 | 7.5 | 21 | 12 | 16 | 5.51 | 2.19 | .33 | 5.4 | .056 | .48 |

| Sample | $P_2O_5$ % | $SO_3$ % | Cl % | Cd ppm | Cu ppm | Li ppm | Pb ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177712 | 1.0 L | 25 | 0.20 L | 1.0L | 57 | 10 L | 25 | 20 | 1000 | 5000 | 50 |
| D177713 | 1.7 | 11 | .20 L | 1.0L | 37 | 10 L | 25 L | 31 | 1000 | 10000 | N |
| D177714 | 2.4 | 13 | .20 L | 1.0L | 76 | 19 | 50 | 34 | 1000 | 10000 | 3 |

| Sample | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177712 | 70 | 70 | 50 | 100 | N | 7 | 20 | N | 100 | 20 |
| D177713 | 10 L | 20 | 15 | N | N | 7 | N | N | 20 | N |
| D177714 | 15 | 10 | 30 | N | 100 L | 10 | 20 | N | 50 | 15 |

| Sample | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|
| D177712 | 1000 | 100 | 100 | 10 | 100 |
| D177713 | 2000 | 70 | 20 | B | 100 |
| D177714 | 2000 | 150 | 70 | 5 | 100 |

Table 9f.--Major and minor oxide and trace element composition of the laboratory ash of 15 Anderson coal samples from USGS core hole RM-3, NW 1/4 NW 1/4 sec. 25, T. 56 N., R. 73 W., Campbell County, Wyoming

[Values are in either percent or parts per million. The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

Anderson coal bed 92.5 to 124.5 feet

| Sample | Depth (feet) | Ash % | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176502 | 92.5 - 95.3 | 16.0 | 50 | 11 | 15 | 3.83 | 0.65 | 1.1 | 4.0 | 0.045 | 0.83 |
| D176503 | 95.3 - 97.3 | 7.9 | 21 | 13 | 31 | 6.66 | 1.31 | .71 | 5.6 | .084 | .58 |
| D176504 | 97.3 - 99.5 | 8.6 | 23 | 14 | 30 | 6.44 | 1.40 | .31 | 4.8 | .095 | .74 |
| D176505 | 99.5 - 102.5 | 15.0 | 35 | 21 | 19 | 4.03 | .92 | .29 | 3.2 | .063 | 1.6 |
| D176506 | 102.5 - 105.3 | 6.6 | 12 | 12 | 35 | 7.24 | 2.31 | .22 | 5.6 | .11 | .69 |
| D176507 | 105.3 - 107.1 | 7.7 | 14 | 13 | 34 | 6.91 | 2.13 | .16 | 4.9 | .11 | .83 |
| D176508 | 107.1 - 110.5 | 7.5 | 17 | 11 | 34 | 6.99 | 2.20 | .16 | 5.0 | .12 | 1.0 |
| D176509 | 110.5 - 112.0 | 5.8 | 7.5 | 10 | 37 | 7.60 | 3.10 | .19 | 6.3 | .11 | .70 |
| D176510 | 112.0 - 114.5 | 6.7 | 16 | 11 | 35 | 7.39 | 2.63 | .18 | 4.3 | .12 | .53 |
| D176511 | 114.5 - 116.5 | 7.4 | 18 | 9.6 | 34 | 7.19 | 2.54 | .16 | 5.0 | .12 | .59 |
| D176512 | 116.5 - 118.5 | 7.0 | 15 | 10 | 34 | 7.25 | 2.83 | .20 | 5.2 | .11 | .91 |
| D176513 | 118.8 - 120.5 | 7.0 | 15 | 10 | 35 | 7.20 | 2.93 | .17 | 5.0 | .11 | .64 |
| D176514 | 120.5 - 122.5 | 6.5 | 5.8 | 11 | 35 | 7.70 | 3.01 | .17 | 5.4 | .11 | .50 |
| D176515 | 122.5 - 123.9 | 26.0 | 45 | 26 | 8.5 | 2.84 | .84 | 1.3 | 3.2 | .027 | .93 |
| D176516 | 123.9 - 124.5 | 36.6 | 51 | 28 | 3.9 | 1.88 | .55 | 1.4 | 3.2 | .012 | .87 |

| Sample | $P_2O_5$ % | $SO_3$ % | Cd ppm | Cu ppm | Li ppm | Pb ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D176502 | 1.0 | 11 | 1.0L | 121 | 20 L | 25 L | 77 | 300 | 2000 | N |
| D176503 | 2.2 | 16 | 1.0L | 123 | 20 L | 25 L | 33 | 700 | 5000 | N |
| D176504 | 2.1 | 14 | 1.0L | 128 | 48 | 25 | 36 | 700 | 5000 | N |
| D176505 | 3.4 | 9.7 | 1.0L | 242 | 115 | 30 | 28 | 300 | 7000 | N |
| D176506 | 2.5 | 18 | 1.0L | 146 | 33 | 25 L | 65 | 1000 | 7000 | N |
| D176507 | 4.6 | 7.6 | 1.0L | 158 | 32 | 25 L | 30 | 700 | 10000 | N |
| D176508 | 2.6 | 11 | 1.0L | 214 | 38 | 25 L | 41 | 700 | 7000 | N |
| D176509 | 3.3 | 18 | 1.0L | 126 | 20 L | 25 L | 30 | 1000 | 7000 | N |
| D176510 | 3.0 | 12 | 1.0L | 92 | 20 | 25 L | 67 | 700 | 10000 | N |
| D176511 | 2.7 | 11 | 1.0L | 94 | 20 | 25 L | 28 | 700 | 7000 | N |
| D176512 | 2.7 | 12 | 1.0L | 151 | 20 L | 40 | 26 | 700 | 7000 | N |
| D176513 | 3.6 | 12 | 1.0L | 126 | 20 L | 25 | 53 | 700 | 10000 | N |
| D176514 | 2.6 | 25 | 1.0L | 94 | 20 L | 35 | 152 | 700 | 7000 | N |
| D176515 | 1.2 | 4.5 | 1.0L | 186 | 47 | 30 | 55 | 200 | 3000 | 3 |
| D176516 | .24 | 2.5 | 1.0 | 142 | 64 | 55 | 244 | 150 | 1000 | 7 |

Table 9f.--Major and minor oxide and trace element composition of the laboratory ash of 15 Anderson coal samples from USGS core hole RM-3, NW 1/4 NW 1/4 sec. 25, T. 56 N., R. 73 W., Campbell County, Wyoming--Continued

| Sample | Ce ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D176502 | N | 15 | 70 | 30 | 100 L | 7 | 30 | | N | 2020 |
| D176503 | N | 15 | 70 | 30 | 100 L | 10 | 20 L | | N | 30 15 |
| D176504 | N | 15 | 70 | 30 | N | 7 | 20 L | | B | 3020 |
| D176505 | 500 L | 15 | 70 | 50 | 100 | 7 | 30 | 150 L | 20 | 30 |
| D176506 | N | 20 | 50 | 30 | N | 30 | 20 L | | B | 5030 |
| D176507 | N | 15 | 30 | 30 | 100 L | N | 20 L | | N | 3030 |
| D176508 | N | 15 | 30 | 15 | N | 30 | 20 | | B | 3020 |
| D176509 | N | 15 | 30 | 30 | N | 15 | 20 L | | B | 3020 |
| D176510 | N | 15 | 50 | 15 | N | 15 | 20 L | | B | 3030 |
| D176511 | N | 15 | 30 | 15 | N | 7 | 20 L | | B | 3020 |
| D176512 | N | 15 | 50 | 15 | N | 15 | 20 L | | B | 3015 |
| D176513 | N | 15 | 50 | 20 | 100 L | 20 | 20 L | | N | 5015 |
| D176514 | N | 30 | 70 | 30 | N | 50 | 20 L | | B | 7015 |
| D176515 | N | 15 | 150 | 50 | 100 | 15 | 30 | 150 L | 30 | 30 |
| D176516 | N | 15 | 150 | 50 | 100 L | 15 | 30 | 150 L | 30 | 30 |

| Sample | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|
| D176502 | 700 | 150 | 70 | 7 | 300 |
| D176503 | 1000 | 150 | 30 | 5 | 150 |
| D176504 | 1000 | 200 | 30 | 7 | 150 |
| D176505 | 1000 | 300 | 30 | 5 | 200 |
| D176506 | 1500 | 300 | 30 | 5 | 150 |
| D176507 | 3000 | 200 | 30 | 5 | 150 |
| D176508 | 1500 | 200 | 30 | 3 | 200 |
| D176509 | 2000 | 200 | 30 | 3 | 150 |
| D176510 | 2000 | 150 | 30 | 3 | 150 |
| D176511 | 1500 | 150 | 30 | 3 | 150 |
| D176512 | 1500 | 150 | 30 | 3 | 150 |
| D176513 | 2000 | 150 | 30 | 3 | 150 |
| D176514 | 1500 | 150 | 50 | 3 | 150 |
| D176515 | 1500 | 500 | 50 | 5 | 200 |
| D176516 | 300 | 300 | 50 | 5 | 200 |

Table 9g.--Major and minor oxide and trace element composition of the laboratory ash of 7 Anderson coal samples from USGS core hole RM-4, SW 1/4 SW 1/4 sec. 25, T. 56 N., R. 73 W., Campbell County, Wyoming

[Values are in either percent or parts per million. The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

Anderson coal bed 129.4 to 167.0 feet

| Sample | Depth (feet) | Ash % | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176799 | 129.4 - 130.0 | 8.0 | 25 | 8.8 | 19 | 6.76 | 2.70 | 0.41 | 4.3 | 0.050L | 0.96 |
| D176800 | 130.0 - 136.4 | 7.4 | 19 | 12 | 21 | 7.79 | 2.98 | .46 | 4.8 | .050L | .87 |
| D176801 | 136.4 - 143.0 | 7.9 | 19 | 14 | 19 | 7.89 | 2.83 | .16 | 4.1 | .050L | 1.6 |
| D176802 | 143.0 - 148.9 | 6.9 | 19 | 13 | 21 | 7.84 | 3.08 | .16 | 4.6 | .050L | 1.3 |
| D176803 | 148.9 - 156.7 | 6.9 | 20 | 12 | 22 | 7.90 | 3.20 | .16 | 4.1 | .050L | 1.7 |
| D176804 | 156.7 - 163.0 | 6.5 | 1.7 | 11 | 22 | 7.93 | 3.43 | .14 | 4.0 | .050L | .85 |
| D176805 | 163.0 - 167.0 | 20.4 | 42 | 24 | 5.7 | 3.09 | .93 | .98 | 3.4 | .050L | 1.0 |

| Sample | $P_2O_5$ % | $SO_3$ % | Cl % | Cd ppm | Cu ppm | Li ppm | Pb ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176799 | 1.0 L | 21 | 0.20 L | 1.0L | 55 | 10 L | 25 | 97 | 700 | 3000 | 20 |
| D176800 | 1.0 L | 18 | .20 L | 1.0 | 111 | 12 | 35 | 116 | 700 | 5000 | N |
| D176801 | 1.0 L | 14 | .20 L | 1.0L | 215 | 40 | 45 | 128 | 500 | 5000 | N |
| D176902 | 1.0 L | 13 | .20 L | 1.0 | 157 | 34 | 35 | 58 | 700 | 5000 | N |
| D176903 | 1.0 L | 13 | .20 L | 1.0 | 212 | 20 | 35 | 153 | 500 | 5000 | N |
| D176904 | 20 | 7.9 | .20 L | 1.0L | 101 | 10 L | 25 | 138 | 700 | 7000 | N |
| D176905 | 1.0 L | 9.9 | .20 L | 1.0L | 117 | 49 | 30 | 271 | 200 | 1500 | 7 |

| Sample | Ce ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D176799 | N | 15 | 100 | B | 30 | N | 15 | 50 | B | 30 |
| D176800 | N | 15 | 70 | 20 | N | N | 15 | 20 L | B | 30 |
| D176801 | N | 15 | 70 | 30 | N | 100 L | 15 | 30 | N | 30 |
| D176802 | N | 15 | 30 | 15 | N | N | N | 20 | B | 20 |
| D176803 | N | 15 | 30 | 15 | N | N | N | 30 | B | 20 |
| D176804 | N | 15 | 30 | 15 | N | 100 L | 15 | 20 | N | 30 |
| D176805 | 500 L | 15 | 100 | 30 | N | 100 L | 15 | 30 | N | 30 |

| Sample | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|
| D176799 | 70 | 700 | 500 | 150 | 150 | 300 |
| D176800 | 15 | 700 | 150 | 30 | 3 | 150 |
| D176801 | 20 | 700 | 300 | 30 | 3 | 200 |
| D176802 | 20 | 700 | 150 | 30 | 3 | 150 |
| D176803 | 15 | 700 | 200 | 30 | 3 | 200 |
| D176804 | 15 | 700 | 100 | 30 | 3 | 150 |
| D176805 | 20 | 500 | 300 | 70 | 5 | 150 |

Table 9h.--Major and minor oxide and trace element composition of the laboratory ash of 6 Canyon A coal samples from USGS core hole RM-4, SW 1/4 SW 1/4 sec. 25, T. 56 N., R. 73 W., Campbell County, Wyoming

[Values are in either percent or parts per million. The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

Canyon A coal bed 298.0 to 320.5 feet

| Sample | Depth (feet) | Ash % | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176806 | 298.0 - 299.0 | 10.9 | 7.7 | 8.3 | 11 | 4.43 | 1.73 | 0.20 | 29 | 0.050L | 0.43 |
| D176807 | 299.0 - 303.0 | 10.8 | 35 | 9.1 | 13 | 4.63 | 1.85 | .27 | 2.9 | .050L | 2.0 |
| D176808 | 305.0 - 306.0 | 10.4 | 38 | 11 | 11 | 4.20 | 1.96 | .76 | 6.4 | .050L | .92 |
| D176809 | 306.0 - 308.4 | 5.9 | 6.6 | 12 | 23 | 8.27 | 3.90 | .20 | 4.6 | .050L | .79 |
| D176810 | 308.4 - 312.0 | 6.2 | 11 | 9.5 | 21 | 7.75 | 3.66 | .17 | 10 | .089 | .89 |
| D176811 | 312.0 - 316.0 | 5.9 | 21 | 12 | 21 | 7.79 | 3.59 | .23 | 4.7 | .050L | 1.0 |
| D176812 | 316.0 - 320.5 | 5.7 | 17 | 13 | 21 | 7.95 | 3.81 | .32 | 4.9 | .050L | 1.0 |

| Sample | $P_2O_5$ % | $SO_3$ % | Cl % | Cd ppm | Cu ppm | Li ppm | Pb ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176806 | 1.3 | 27 | 0.20 L | 1.5 | 61 | 10 L | 25 L | 374 | 300 | 3000 | 30 |
| D176807 | 1.0 L | 25 | .20 L | 1.0L | 121 | 11 | 30 | 115 | 300 | 3000 | 15 |
| D176808 | 1.0 L | 17 | .20 L | 1.0L | 68 | 10 | 25 L | 398 | 300 | 3000 | 10 |
| D176809 | 1.2 | 24 | .20 L | 1.0L | 60 | 10 L | 25 | 85 | 700 | 7000 | 7 |
| D176810 | 1.0 L | 16 | .20 L | 1.0L | 107 | 10 L | 25 L | 145 | 700 | 5000 | N |
| D176811 | 1.0 L | 12 | .20 L | 1.0L | 126 | 10 L | 35 | 147 | 700 | 7000 | 7 |
| D176812 | 1.0 L | 14 | .20 L | 1.0L | 160 | 10 | 55 | 157 | 700 | 7000 | 10 |

| Sample | Ce ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D176806 | 500 L | 70 | 50 | B | 70 | 100 L | 70 | 30 | N | |
| D176807 | 500 L | 10 | 50 | 20 | N | 100 L | 15 | 30 | N | 30 |
| D176808 | 500 L | 20 | 70 | 70 | N | 100 L | 7 | 50 | N | 50 |
| D176809 | N | 30 | 30 | 15 | N | 100 L | 7 | 20 L | N | 70 |
| D176810 | N | 15 | 30 | 15 | N | N | 7 | 20 | B | 50 |
| D176811 | N | 15 | 30 | 15 | N | 100 L | 7 | 30 | N | 30 |
| D176812 | 500 L | 20 | 200 | 30 | N | 150 | 15 | 30 | 150 | 30 |

| Sample | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|
| D176807 | 15 | 700 | 150 | 70 | 7 | 200 |
| D176808 | 30 | 700 | 150 | 70 | 7 | 300 |
| D176809 | 15 | 1500 | 100 | 70 | 7 | 100 |
| D176810 | 15 | 700 | 100 | 30 | 5 | 150 |
| D176811 | 20 | 1000 | 150 | 70 | 7 | 200 |
| D176812 | 30 | 1000 | 300 | 100 | 7 | 200 |

Table 9i.--Major and minor oxide and trace element composition of the laboratory ash of 7 Canyon B coal samples from USGS core hole RM-4, SW 1/4 SW 1/4 sec. 25, T. 56 N., R. 73 W., Campbell County, Wyoming

[Values are in either percent or parts per million. The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

Canyon B coal bed 323.0 to 349.0 feet

| Sample | Depth (feet) | Ash % | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176813 | 323.0 - 327.0 | 8.8 | 36 | 16 | 14 | 5.59 | 2.15 | 0.50 | 4.1 | 0.050L | 0.82 |
| D176814 | 327.0 - 332.3 | 5.3 | 9.0 | 11 | 24 | 8.62 | 3.94 | .19 | 11 | .20 | .57 |
| D176815 | 332.3 - 335.3 | 6.4 | 12 | 7.3 | 19 | 7.84 | 2.98 | .19 | 22 | .37 | .40 |
| D176816 | 335.3 - 338.4 | 5.8 | 14 | 5.3 | 19 | 8.12 | 3.46 | .18 | 18 | .31 | .45 |
| D176817 | 338.4 - 342.0 | 4.4 | 6.9 | 11 | 27 | 9.50 | 4.66 | .22 | 4.9 | .050L | .50 |
| D176818 | 342.0 - 346.0 | 7.8 | 22 | 18 | 14 | 5.31 | 2.46 | .39 | 5.0 | .050L | .99 |
| D176819 | 346.0 - 349.0 | 11.7 | 38 | 18 | 10 | 3.75 | 1.55 | .55 | 2.9 | .050L | 1.1 |

| Sample | $P_2O_5$ % | $SO_3$ % | Cl % | Cd ppm | Cu ppm | Li ppm | Pb ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D176813 | 1.0 L | 11 | 0.20 L | 1.0L | 85 | 26 | 45 | 339 | 500 | 3000 | 15 |
| D176814 | 1.0 L | 7.5 | .20 L | 1.0L | 28 | 10 L | 30 | 142 | 700 | 7000 | N |
| D176815 | 1.0 L | 7.9 | .20 L | 1.0L | 45 | 10 L | 25 L | 217 | 700 | 3000 | 3 |
| D176816 | 1.0 L | 7.5 | .20 L | 1.0L | 32 | 10 L | 25 L | 66 | 500 | 5000 | N |
| D176817 | 1.0 L | 13 | .20 L | 1.0L | 52 | 10 L | 30 | 73 | 700 | 7000 | N |
| D176818 | 1.0 L | 17 | .20 L | 1.0L | 121 | 37 | 25 L | 74 | 500 | 3000 | 3 |
| D176819 | 1.0 L | 14 | .20 L | 1.0L | 144 | 39 | 25 | 288 | 300 | 3000 | 7 |

| Sample | Ce ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D176813 | 500 L | 30 | 50 | 15 | N | 100 L | 10 | 20 | N | 30 |
| D176814 | N | 10 | 15 | 15 | N | N | 7 | 30 | N | 20 |
| D176815 | B | 15 | 15 | 15 | N | N | 7 | 20 L | B | 30 |
| D176816 | N | 10 L | 15 | 10 | N | N | 7 | 20 L | B | 30 |
| D176817 | N | 15 | 15 | 10 | N | N | 7 | 20 L | B | 50 |
| D176818 | 500 | 20 | 50 | 30 | N | 150 | 10 | 30 | 200 | 70 |
| D176819 | 500 L | 15 | 70 | 20 | N | 100 L | 7 | 20 | N | 50 |

| Sample | Sc ppm-S | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|
| D176813 | 20 | 500 | 150 | 100 | 7 | 150 |
| D176814 | 10 L | 1000 | 70 | 20 | 3 | 150 |
| D176815 | 10 | 700 | 50 | 30 | 7 | 70 |
| D176816 | 10 L | 700 | 30 | 20 L | 2 L | 70 |
| D176817 | 10 | 700 | 70 | 30 | 3 | 70 |
| D176818 | 15 | 700 | 200 | 70 | 7 | 150 |
| D176819 | 20 | 500 | 200 | 70 | 7 | 150 |

Table 9j.--Major and minor oxide and trace element composition of the laboratory ash of 6 Anderson coal samples from USGS core hole RM-5, SE 1/4 SE 1/4 sec. 27, T. 56 N., R. 73 W., Campbell County, Wyoming

[Values are in either percent or parts per million. The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

Anderson coal bed coal bed 135.2 to 168.6 feet

| Sample | Depth (feet) | Ash % | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177715 | 135.2 - 136.2 | 17.2 | 50 | 8.2 | 8.4 | 2.71 | 1.13 | 1.0 | 4.2 | 0.050L | 0.49 |
| D177716 | 136.2 - 140.0 | 9.1 | 34 | 11 | 16 | 4.68 | 2.36 | .73 | 2.9 | .057 | .67 |
| D177717 | 140.0 - 149.0 | 1.8 | 31 | 16 | 14 | 3.97 | 1.74 | .33 | 3.2 | .050L | 1.3 |
| D177718 | 149.0 - 157.2 | 7.8 | 24 | 11 | 21 | 6.04 | 2.73 | .14 | 3.1 | .063 | 1.2 |
| D177719 | 157.2 - 165.6 | 7.2 | 16 | 9.6 | 22 | 6.54 | 3.16 | .14 | 4.7 | .069 | .80 |
| D177720 | 165.6 - 168.6 | 21.6 | 43 | 21 | 6.5 | 2.51 | 1.05 | .90 | 2.6 | .050L | .89 |

| Sample | $P_2O_5$ % | $SO_3$ % | Cl % | Cd ppm | Cu ppm | Li ppm | Pb ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177715 | 1.0 L | 11 | 0.20 L | 1.0L | 52 | 18 | 25 | 115 | 700 | 2000 | 15 |
| D177716 | 1.0 L | 12 | .20 L | 1.0L | 85 | 15 | 25 L | 57 | 1000 | 3000 | N |
| D177717 | 1.0 L | 11 | .20 L | 1.0L | 186 | 97 | 40 | 63 | 700 | 5000 | N |
| D177718 | 1.0 L | 11 | .20 L | 1.0L | 140 | 43 | 25 | 36 | 1000 | 7000 | N |
| D177719 | 1.0 L | 17 | .20 L | 1.0L | 94 | 16 | 25 | 38 | 1000 | 7000 | N |
| D177720 | 1.0 L | 8.8 | .20 L | 1.0 | 147 | 72 | 45 | 169 | 300 | 3000 | 10 |

| Sample | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177715 | 15 | 70 | 50 | N | N | 15 | 30 | B | 30 | 20 |
| D177716 | 15 | 70 | 30 | N | N | 10 | N | B | 20 | 15 |
| D177717 | 15 | 70 | 30 | N | 100 L | 10 | 20 | N | 50 | 20 |
| D177718 | 10 | 50 | 30 | N | N | 7 | 20 | B | 15 | 20 |
| D177719 | 10 | 50 | 30 | N | N | 15 | N | B | 20 | 15 |
| D177720 | 10 | 200 | 70 | 20 | 150 | 50 | 30 | 150 | 30 | 30 |

| Sample | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|
| D177715 | 500 | 300 | 70 | 7 | 200 |
| D177716 | 1000 | 200 | 50 | 5 | 150 |
| D177717 | 1000 | 300 | 50 | 5 | 150 |
| D177718 | 2000 | 200 | 50 | 5 | 150 |
| D177719 | 2000 | 150 | 30 | 3 | 100 |
| D177720 | 500 | 500 | 150 | 15 | 150 |

Table 9k.--Major and minor oxide and trace element composition of the laboratory ash of 9 Canyon coal samples from USGS core hole RM-5, SE 1/4 SE 1/4 sec. 27, T. 56 N., R. 73 W., Campbell County, Wyoming

[Values are in either percent or parts per million. The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

Canyon coal bed 354.9 to 395.5 feet

| Sample | Depth (feet) | Ash % | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177721 | 354.9 - 356.4 | 9.3 | 7.6 | 6.2 | 15 | 4.86 | 2.20 | 0.092 | 13 | 0.086 | 0.38 |
| D177722 | 356.5 - 360.2 | 8.9 | 27 | 9.1 | 18 | 5.68 | 2.35 | .14 | 2.6 | .090 | 1.4 |
| D177723 | 360.2 - 361.8 | 70.7 | 83 | 9.5 | .82 | .65 | .20 | 1.5 | .71 | .050L | .68 |
| D177724 | 361.8 - 370.7 | 6.1 | 13 | 10 | 22 | 7.45 | 3.35 | .13 | 4.5 | .082 | .64 |
| D177725 | 371.1 - 374.8 | 10.4 | 39 | 14 | 14 | 4.68 | 1.92 | .78 | 2.3 | .067 | 1.0 |
| D177726 | 374.8 - 375.9 | 13.1 | 61 | 21 | .78 | 1.08 | .26 | 1.6 | 1.9 | .050L | .70 |
| D177727 | 375.9 - 384.3 | 5.9 | 12 | 9.4 | 26 | 8.57 | 3.17 | .17 | 4.3 | .14 | .47 |
| D177728 | 384.3 - 392.2 | 6.0 | 8.7 | 9.4 | 24 | 7.70 | 3.27 | .13 | 8.4 | .17 | .48 |
| D177729 | 392.2 - 395.5 | 20.2 | 40 | 22 | 6.2 | 2.61 | .92 | .74 | 4.3 | .066 | .86 |

| Sample | $P_2O_5$ % | $SO_3$ % | Cl % | Cd ppm | Cu ppm | Li ppm | Pb ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177721 | 1.0 L | 34 | 0.20 L | 1.0L | 64 | 10 | 25 L | 64 | 700 | 5000 | 20 |
| D177722 | 1.0 | 17 | .20 L | 1.0L | 146 | 25 | 35 | 44 | 700 | 7000 | N |
| D177723 | 1.0 L | .70 | .20 | 1.0L | 31 | 31 | 25 L | 29 | 100 | 700 | N |
| D177724 | 1.5 | 14 | .20 L | 1.0L | 127 | 13 | 30 | 39 | 1000 | 10000 | 3 |
| D177725 | 1.0 L | 5.9 | .20 L | 1.0L | 144 | 34 | 30 | 44 | 700 | 7000 | 5 |
| D177726 | 1.0 L | .21 | .20 L | 1.0L | 46 | 65 | 30 | 189 | 100 | 700 | N |
| D177727 | 1.1 | 10 | .20 L | 1.0L | 52 | 14 | 25 | 75 | 1000 | 10000 | 3 |
| D177728 | 1.7 | 16 | .20 L | 1.0L | 46 | 10 L | 25 L | 62 | 1000 | 15000 | N |
| D177729 | 1.0 L | 9.0 | .20 L | 1.0L | 121 | 75 | 45 | 128 | 300 | 2000 | 3 |

Table 9k.--Major and minor oxide and trace element composition of the laboratory ash of 9 Canyon coal samples from USGS core hole RM-5, SE 1/4 SE 1/4, sec. 27, T. 56 N., R. 73 W., Campbell County, Wyoming.--Continued

| Sample | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177721 | N | 15 | 30 | N | 100 L | 30 | N | N | 50 | 15 | 700 |
| D177722 | 10 | 70 | 30 | N | 100 L | 7 | 30 | N | 30 | 15 | 1500 |
| D177723 | 10 L | 70 | 20 | N | N | N | 30 | N | 10 L | 10 | 200 |
| D177724 | 20 | 50 | 20 | N | N | 10 | N | N | 30 | 15 | 3000 |
| D177725 | 15 | 100 | 50 | N | 100 L | 7 | 30 | N | 20 | 30 | 1000 |
| D177726 | 20 | 100 | 50 | N | N | N | 30 | N | 50 | 15 | 300 |
| D177727 | 15 | 30 | 30 | N | 100 L | 7 | 20 | N | 30 | 10 | 2000 |
| D177728 | 10 | 30 | 20 | N | 100 | 10 | N | N | 30 | 10 | 3000 |
| D177729 | 30 | 100 | 70 | N | 100 L | 15 | 30 | N | 100 | 15 | 500 |

| Sample | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|
| D177721 | 70 | 100 | 10 | 70 |
| D177722 | 200 | 70 | 7 | 150 |
| D177723 | 100 | 30 | 5 | 300 |
| D177724 | 150 | 50 | 5 | 150 |
| D177725 | 300 | 70 | 7 | 150 |
| D177726 | 300 | 30 | 3 | 150 |
| D177727 | 70 | 50 | 5 | 70 |
| D177728 | 100 | 50 | 5 | 70 |
| D177729 | 300 | 70 | 7 | 150 |

Table 91.--Major and minor oxide and trace element composition of the laboratory ash of 5 Anderson coal samples from USGS core hole RM-6, NW 1/4 NE 1/4 sec. 21, T. 56 N., R. 73 W., Campbell County, Wyoming

[Values are in either percent or parts per million. The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

Anderson coal bed 88.9 to 120.0 feet

| Sample | Depth (feet) | Ash % | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177730 | 88.9 - 90.4 | 9.6 | 33 | 14 | 15 | 4.12 | 2.15 | 0.89 | 2.7 | 0.064 | 0.72 |
| D177731 | 90.4 - 97.7 | 11.6 | 29 | 17 | 14 | 4.00 | 1.96 | .54 | 3.4 | .062 | .90 |
| D177732 | 97.7 - 107.4 | 13.5 | 32 | 18 | 13 | 3.59 | 1.65 | .38 | 4.3 | .065 | 1.3 |
| D177733 | 107.4 - 116.9 | 15.4 | 16 | 11 | 23 | 6.34 | 3.31 | .10 | 3.9 | .080 | .74 |
| D177734 | 116.9 - 120.0 | 11.9 | 30 | 18 | 13 | 4.17 | 2.05 | .65 | 2.6 | .061 | 1.1 |

| Sample | $P_2O_5$ % | $SO_3$ % | Cl % | Cd ppm | Cu ppm | Li ppm | Pb ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177730 | 1.0 L | 14 | 0.20 L | 1.0L | 70 | 23 | 25 | 90 | 1000 | 5000 | 15 |
| D177731 | 1.0 L | 13 | .20 L | 1.0L | 135 | 47 | 40 | 42 | 500 | 5000 | N |
| D177732 | 1.0 L | 11 | .20 L | 1.0L | 260 | 95 | 35 | 207 | 500 | 5000 | N |
| D177733 | 1.0 L | 14 | .20 L | 1.0L | 118 | 28 | 25 | 32 | 1000 | 7000 | N |
| D177734 | 1.0 L | 14 | .20 L | 1.0L | 161 | 36 | 40 | 36 | 500 | 5000 | 3 |

| Sample | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177730 | 15 | 100 | 70 | N | N | 50 | 20 | N | 30 | 30 |
| D177731 | 15 | 150 | 70 | N | 100 L | 15 | 20 | N | 30 | 30 |
| D177732 | 15 | 100 | 50 | N | 100 L | 15 | 30 | N | 50 | 30 |
| D177733 | 10 | 50 | 30 | N | N | 7 | 20 | N | 15 | 20 |
| D177734 | 10 | 150 | 70 | N | 100 L | 20 | 30 | N | 20 | 20 |

| Sample | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|
| D177730 | 1000 | 300 | 100 | 10 | 150 |
| D177731 | 1000 | 300 | 70 | 7 | 150 |
| D177732 | 1000 | 300 | 70 | 7 | 150 |
| D177733 | 1500 | 150 | 30 | 3 | 100 |
| D177734 | 1000 | 500 | 70 | 7 | 150 |

Table 9m.--Major and minor oxide and trace element composition of the laboratory ash of 6 Canyon coal samples from USGS core hole RM-6, NW 1/4 SE 1/4 sec. 21, T. 56 N., R. 73 W., Campbell County, Wyoming

[Values are in either percent or parts per million. The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

Canyon coal bed 256.5 to 302.7 feet

| Sample | Depth (feet) | Ash % | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177735 | 265.5 - 257.2 | 23.7 | 50 | 17 | 6.0 | 3.34 | 0.86 | 2.8 | 3.7 | 0.072 | 0.72 |
| D177736 | 257.2 - 261.2 | 10.8 | 29 | 22 | 13 | 4.05 | 1.96 | .79 | 3.0 | .075 | .82 |
| D177737 | 272.1 - 272.7 | 44.3 | 49 | 22 | 2.6 | 1.93 | .50 | 1.5 | 5.6 | .070 | .67 |
| D177738 | 272.7 - 285.2 | 15.6 | 42 | 22 | 9.1 | 3.30 | 1.34 | 1.0 | 4.0 | .073 | .93 |
| D177739 | 285.2 - 297.9 | 6.8 | 18 | 7.5 | 24 | 6.91 | 2.94 | .18 | 7.7 | .20 | .57 |
| D177740 | 297.9 - 302.7 | 5.9 | 14 | 7.8 | 27 | 7.37 | 3.44 | .21 | 4.3 | .13 | .57 |

| Sample | $P_2O_5$ % | $SO_3$ % | Cl % | Cd ppm | Cu ppm | Li ppm | Pb ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177735 | 1.0 L | 6.3 | 0.20 L | 1.0L | 115 | 47 | 50 | 207 | 300 | 3000 | 20 |
| D177736 | 1.0 L | 12 | .20 L | 1.0L | 110 | 53 | 40 | 38 | 700 | 5000 | 15 |
| D177737 | 1.0 L | 4.8 | .20 L | 1.0L | 85 | 66 | 35 | 237 | 150 | 1000 | 15 |
| D177738 | 1.0 L | 7.2 | .20 L | 1.0L | 122 | 65 | 40 | 167 | 500 | 3000 | 3 |
| D177739 | 1.0 L | 5.5 | .20 L | 1.0L | 46 | 11 | 25 L | 38 | 1000 | 7000 | N |
| D177740 | 1.1 | 10 | .20 L | 1.0L | 61 | 10 L | 25 | 43 | 1000 | 10000 | 5 |

| Sample | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S | La ppm-S | Mo ppm-S | Nb ppm-S | Nd ppm-S | Ni ppm-S | Sc ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177735 | 50 | 150 | 70 | 100 | 100 L | 15 | 30 | 150 | 100 | 30 |
| D177736 | 20 | 150 | 50 | N | 100 L | 10 | 20 | N | 50 | 20 |
| D177737 | 30 | 150 | 50 | N | N | 15 | 20 | N | 70 | 20 |
| D177738 | 15 | 100 | 30 | N | 100 L | 7 | 20 | N | 50 | 20 |
| D177739 | N | 30 | 15 | N | N | 7 | N | N | 15 | 10 L |
| D177740 | 10 | 70 | 20 | N | 100 | 100 | 20 | N | 50 | 20 |

| Sample | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|
| D177735 | 2000 | 300 | 150 | 15 | 150 |
| D177736 | 1000 | 300 | 70 | 7 | 150 |
| D177737 | 500 | 300 | 70 | 7 | 150 |
| D177738 | 1500 | 300 | 50 | 7 | 150 |
| D177739 | 2000 | 70 | 30 | 3 | 150 |
| D177740 | 2000 | 150 | 70 | 7 | 100 |

Table 9n.--Major and minor oxide and trace element composition of the laboratory ash of 5 Anderson coal samples from USGS core hole RM-7, NE 1/4 NW 1/4 sec. 26, T. 56 N., R. 73 W., Campbell County, Wyoming

[Values are in either percent or parts per million. The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

Anderson coal bed 133.2 to 170.3 feet

| Sample | Depth (feet) | Ash % | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177741 | 133.2 - 134.0 | 7.3 | 27 | 12 | 20 | 6.47 | 2.86 | 0.52 | 3.4 | 0.055 | 0.64 |
| D177742 | 134.0 - 141.0 | 6.8 | 23 | 10 | 22 | 7.07 | 2.77 | .26 | 4.2 | .050L | .70 |
| D177743 | 141.0 - 154.0 | 7.6 | 25 | 12 | 21 | 6.66 | 2.50 | .17 | 3.3 | .050L | 1.5 |
| D177744 | 154.0 - 161.9 | 6.6 | 18 | 12 | 23 | 7.85 | 3.27 | .16 | 3.7 | .050L | .72 |
| D177745 | 161.9 - 170.3 | 7.5 | 22 | 16 | 18 | 6.41 | 2.81 | .42 | 4.4 | .050L | .63 |

| Sample | $P_2O_5$ % | $SO_3$ % | Cl % | Cd ppm | Cu ppm | Li ppm | Pb ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177741 | 1.0 L | 13 | 0.20 L | 1.0L | 153 | 15 | 30 | 77 | 1000 | 5000 | 50 |
| D177742 | 1.0 L | 10 | .20 L | 1.0L | 92 | 12 | 25 | 30 | 1000 | 7000 | 7 |
| D177743 | 1.0 L | 9.4 | .20 L | 1.0L | 221 | 31 | 30 | 49 | 700 | 7000 | N |
| D177744 | 1.0 L | 9.8 | .20 L | 1.0L | 100 | 31 | 25 | 57 | 700 | 7000 | N |
| D177745 | 1.0 L | 14 | .20 L | 1.0 | 141 | 47 | 50 | 101 | 1000 | 5000 | 15 |

| Sample | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S | La ppm-S | Mo ppm-S | Nb ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177741 | 15 | 150 | 150 | 50 | N | 15 | 70 | 20 | 100 | 1000 |
| D177742 | 10 | 50 | 20 | N | N | N | N | 15 | 25 | 2500 |
| D177743 | 10 | 70 | 30 | N | N | N | N | 15 | 20 | 1000 |
| D177744 | 15 | 50 | 30 | N | 100 L | N | N | 20 | 30 | 2000 |
| D177745 | 15 | 100 | 50 | N | 150 | 50 | 20 | 30 | 50 | 2000 |

| Sample | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|
| D177741 | 700 | 150 | 20 | 300 |
| D177742 | 150 | 70 | 5 | 100 |
| D177743 | 300 | 50 | 5 | 150 |
| D177744 | 200 | 30 | 3 | 150 |
| D177745 | 500 | 150 | 15 | 150 |

Table 9o.--Major and minor oxide and trace element composition of the laboratory ash of 6 Canyon A coal samples from USGS core hole RM-7, NE 1/4 NW 1/4 sec. 26, T. 56 N., R. 73 W., Campbell County, Wyoming

[Values are in either percent or parts per million. The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, . etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

Canyon coal bed 286.2 to 329.6 feet

| Sample | Depth (feet) | Ash % | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177746 | 286.2 - 287.3 | 18.2 | 28 | 10 | 5.9 | 2.77 | 0.85 | 1.3 | 19 | 0.050L | 0.46 |
| D177747 | 287.3 - 297.3 | 7.6 | 21 | 9.4 | 19 | 6.76 | 2.23 | .18 | 6.3 | .050L | 1.0 |
| D177748 | 299.2 - 306.3 | 13.1 | 23 | 8.8 | 23 | 7.87 | 2.73 | .18 | 3.7 | .050L | .79 |
| D177749 | 306.3 - 317.7 | 5.3 | 12 | 9.1 | 26 | 8.96 | 3.02 | .17 | 4.1 | .050L | .52 |
| D177750 | 317.7 - 326.0 | 6.2 | 9.3 | 9.0 | 20 | 6.99 | 2.55 | .15 | 14 | .089 | .48 |
| D177751 | 326.0 - 329.6 | 17.4 | 44 | 22 | 6.7 | 2.84 | .92 | .85 | 3.3 | .050L | 1.0 |

| Sample | $P_2O_5$ % | $SO_3$ % | Cl % | Cd ppm | Cu ppm | Li ppm | Pb ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177746 | 1.0 L | 14 | 0.20 L | 1.0L | 80 | 23 | 25 L | 75 | 300 | 2000 | 30 |
| D177747 | 1.1 | 18 | .20 L | 1.0L | 115 | 17 | 25 | 26 | 700 | 7000 | 3 |
| D177748 | 1.0 L | 6.8 | .20 L | 1.0L | 109 | 16 | 30 | 27 | 1000 | 7000 | N |
| D177749 | 1.6 | 4.7 | .20 L | 1.0L | 37 | 10 L | 25 L | 28 | 1000 | 10000 | N |
| D177750 | 1.9 | 17 | .20 L | 1.0L | 61 | 10 L | 25 L | 59 | 1000 | 10000 | N |
| D177751 | 1.0 L | 7.5 | .20 L | 1.0L | 138 | 62 | 45 | 85 | 300 | 3000 | 7 |

| Sample | Ce ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Ge ppm-S | La ppm-S | Mo ppm-S | Nb ppm-S | Ni ppm-S | Sc ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|
| D177746 | N | 15 | 70 | 70 | 100 | N | 30 | 20 | 50 | 30 |
| D177747 | N | 10 | 70 | 30 | N | N | N | N | 20 | 15 |
| D177748 | N | 10 | 50 | 30 | N | N | N | 20 | 15 | 15 |
| D177749 | N | 10 L | 30 | 30 | N | N | N | 20 | 10 | 10 |
| D177750 | N | 15 | 50 | 30 | N | 150 | 15 | N | 50 | 15 |
| D177751 | 500 L | 30 | 200 | 100 | N | 100 | 15 | 50 | 50 | 30 |

| Sample | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|
| D177746 | 300 | 300 | 70 | 7 | 200 |
| D177747 | 1500 | 200 | 30 | 3 | 150 |
| D177748 | 1500 | 150 | 30 | 3 | 150 |
| D177749 | 3000 | 70 | 30 | 3 | 150 |
| D177750 | 3000 | 100 | 50 | 5 | 100 |
| D177751 | 700 | 700 | 70 | 7 | 300 |

Table 9p.--Major and minor oxide and trace element composition of the laboratory ash of 2 Cook coal samples from USGS core hole RM-7, NE 1/4 NW 1/4 sec. 26, T. 56 N., R. 73 W., Campbell County, Wyoming

[Values are in either percent or parts per million. The coals were ashed at 525°C. L after a value means less than the value shown, N means not detected, and B means not determined. S after the element title means that the values listed were determined by semiquantitative spectrographic analysis. The spectrographic results are to be identified with geometric brackets whose boundaries are 1.2, 0.83, 0.56, 0.38, 0.26, 0.18, 0.12, etc., but are reported arbitrarily as mid-points of those brackets, 1.0, 0.7, 0.5, 0.3, 0.2, 0.15, 0.1, etc. The precision of the spectrographic data is approximately one bracket at 68 percent, or two brackets at 95 percent confidence.]

Cook coal bed 369.6 to 382.0 feet

| Sample | Depth (feet) | Ash % | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177752 | 369.6 - 370.8 | 52.8 | 62 | 20 | 2.1 | 1.71 | 0.32 | 1.5 | 2.5 | 0.050L | 0.86 |
| D177753 | 370.8 - 382.0 | 8.3 | 33 | 12 | 17 | 5.38 | 1.84 | .40 | 3.6 | .050L | .86 |

| Sample | $P_2O_5$ % | $SO_3$ % | Cl % | Cd ppm | Cu ppm | Li ppm | Pb ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D177752 | 1.0 L | 1.6 | 0.20 L | 1.0L | 48 | 40 | 25 | 114 | 150 | 1000 | 10 |
| D177753 | 1.5 | 11 | .20 L | 1.0L | 100 | 24 | 25 L | 46 | 1000 | 7000 | 7 |

| Sample | Co ppm-S | Cr ppm-S | Ga ppm-S | La ppm-S | Mo ppm-S | Nb ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S |
|---|---|---|---|---|---|---|---|---|---|
| D177752 | 10 | 150 | 50 | 100 L | N | 30 | 20 | 30 | 500 |
| D177753 | 15 | 100 | 100 | 100 | 15 | 15 | 30 | 30 | 2000 |

| Sample | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|
| D177752 | 300 | 50 | 5 | 200 |
| D177753 | 200 | 100 | 7 | 200 |

Table 10a. Proximate, ultimate, Btu, forms-of-sulfur and fusibility of ash analyses of 9 samples from Anderson coal bed USGS core hole RM-1 SW¼NW¼ sec. 33, T. 56 N., R. 72 W., Campbell County, Wyo.

[All analyses except Btu and fusibility of ash in percent. Original moisture content may be slightly more than shown because samples were collected and transported in plastic bags to avoid metal contamination and water was added where necessary to maintain 100 percent humidity within the bag. Form of analyses: 1, as received; 2, moisture free; 3, moisture and ash free; 4, air dried 30-35°C until constant weight achieved. All analyses by U.S. Bureau of Mines, Coal Analysis Section, Pittsburgh, Pa. (---) indicate no data; 1 ft = .305 meters; to convert from degrees Fahrenheit to degrees Centigrade subtract 32° and multiply by 5/9. To convert Btu/lb to Kcal/kg, multiply by 0.5556.]

| | | | Proximate analysis | | | | Ultimate Analysis | | | | | | Forms of sulfur | | | Fusibility of Ash (°F) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample | Depth (ft) | Forms of analysis | Moisture | Volatile matter | Fixed carbon | Ash | Hydrogen | Carbon | Nitrogen | Oxygen | Sulfur | Btu/lb | Sulfate | Pyritic | Organic | Initial deformation | Softening | Fluid |
| D176630 | 148.2 - 149.0 | 1 | 31.5 | 29.6 | 31.4 | 7.5 | 6.4 | 43.5 | 0.7 | 41.4 | 0.5 | 7360 | 0.01 | 0.01 | 0.45 | 2050 | 2090 | 2130 |
| | | 2 | --- | 43.2 | 45.8 | 10.9 | 4.2 | 63.5 | 1.0 | 19.6 | .7 | 10740 | .01 | .01 | .45 | | | |
| | | 3 | --- | 48.5 | 51.5 | --- | 4.8 | 71.3 | 1.1 | 22.0 | .8 | 12070 | .02 | .02 | .74 | | | |
| | | 4 | 10.8 | 38.5 | 40.9 | 9.8 | 5.0 | 56.8 | 1.0 | 26.8 | .6 | 9590 | --- | --- | --- | | | |
| D176631 | 149.0 - 157.0 | 1 | 33.3 | 29.6 | 33.1 | 4.0 | 6.9 | 44.8 | .4 | 43.5 | .4 | 7540 | .01 | .01 | .35 | 2300 | 2340 | 2380 |
| | | 2 | --- | 44.4 | 49.6 | 6.0 | 4.8 | 67.2 | .6 | 20.8 | .6 | 11300 | .01 | .01 | .52 | | | |
| | | 3 | --- | 47.2 | 52.8 | --- | 5.1 | 71.5 | .6 | 22.2 | .6 | 12030 | .02 | .02 | .56 | | | |
| | | 4 | 14.0 | 38.2 | 42.9 | 5.2 | 5.7 | 57.8 | .6 | 30.2 | .5 | 9730 | --- | --- | --- | | | |
| D176632 | 157.0 - 162.0 | 1 | 31.4 | 32.4 | 32.5 | 3.7 | 7.1 | 46.1 | .6 | 42.2 | .3 | 7860 | .01 | .01 | .26 | 2310 | 2350 | 2390 |
| | | 2 | --- | 47.2 | 47.4 | 5.4 | 5.3 | 67.2 | .9 | 20.8 | .4 | 11460 | .01 | .01 | .38 | | | |
| | | 3 | --- | 49.9 | 50.1 | --- | 5.6 | 71.0 | .9 | 22.0 | .5 | 12110 | .02 | .02 | .40 | | | |
| | | 4 | 11.8 | 41.7 | 41.7 | 4.8 | 5.9 | 59.3 | .8 | 28.8 | .4 | 10110 | --- | --- | --- | | | |
| D176633 | 162.0 - 166.1 | 1 | 32.3 | 29.7 | 32.7 | 5.4 | 6.6 | 44.6 | .7 | 42.4 | .3 | 7500 | .01 | .01 | .25 | 2140 | 2170 | 2200 |
| | | 2 | --- | 43.9 | 48.3 | 8.0 | 4.4 | 65.9 | 1.0 | 20.2 | .4 | 11080 | .01 | .01 | .37 | | | |
| | | 3 | --- | 47.7 | 52.5 | --- | 4.8 | 71.6 | 1.1 | 22.0 | .5 | 12040 | .02 | .02 | .40 | | | |
| | | 4 | 11.6 | 38.7 | 42.7 | 7.0 | 5.3 | 58.2 | .9 | 28.3 | .3 | 9790 | --- | --- | --- | | | |
| D176635 | 167.0 - 172.5 | 1 | 31.3 | 31.3 | 33.0 | 4.4 | 6.8 | 46.9 | .6 | 41.0 | .3 | 7950 | .01 | .01 | .24 | 2360 | 2390 | 2420 |
| | | 2 | --- | 45.6 | 48.0 | 6.4 | 4.8 | 68.3 | .9 | 19.2 | .4 | 11570 | .01 | .01 | .35 | | | |
| | | 3 | --- | 48.7 | 51.3 | --- | 5.2 | 72.9 | .9 | 20.5 | .5 | 12360 | .02 | .02 | .37 | | | |
| | | 4 | 12.9 | 39.7 | 41.8 | 5.6 | 5.6 | 59.4 | .7 | 28.4 | .3 | 10080 | --- | --- | --- | | | |
| D176636 | 172.5 - 175.0 | 1 | 32.5 | 30.4 | 33.3 | 3.8 | 6.7 | 46.2 | .6 | 42.5 | .2 | 7800 | .01 | .01 | .23 | 2350 | 2380 | 2410 |
| | | 2 | --- | 45.0 | 49.3 | 5.6 | 4.6 | 68.4 | .9 | 20.2 | .3 | 11560 | .01 | .01 | .34 | | | |
| | | 3 | --- | 47.7 | 52.3 | --- | 4.8 | 72.5 | .9 | 21.4 | .3 | 12240 | .02 | .02 | .36 | | | |
| | | 4 | 12.3 | 39.5 | 43.2 | 5.0 | 5.5 | 59.9 | .8 | 28.3 | .3 | 10130 | --- | --- | --- | | | |
| D176637 | 175.0 - 177.4 | 1 | 35.0 | 29.0 | 30.5 | 5.5 | 6.9 | 42.9 | .7 | 43.5 | .5 | 7280 | .02 | .01 | .53 | 2350 | 2380 | 2410 |
| | | 2 | --- | 44.6 | 46.9 | 8.5 | 4.6 | 66.0 | 1.1 | 19.1 | .8 | 11200 | .03 | .02 | .82 | | | |
| | | 3 | --- | 48.0 | 51.3 | --- | 5.1 | 72.1 | 1.2 | 20.8 | .8 | 11240 | .03 | .02 | .89 | | | |
| | | 4 | 13.5 | 38.0 | 40.5 | 7.4 | 5.5 | 57.1 | .9 | 28.4 | .7 | 9690 | --- | --- | --- | | | |
| D176638 | 177.4 - 181.0 | 1 | 31.0 | 28.1 | 30.6 | 10.3 | 6.3 | 41.8 | .7 | 40.3 | .6 | 7030 | .01 | .01 | .59 | 2350 | 2380 | 2410 |
| | | 2 | --- | 40.7 | 44.3 | 14.9 | 4.1 | 60.6 | 1.0 | 18.5 | .9 | 10190 | .01 | .01 | .86 | | | |
| | | 3 | --- | 47.9 | 52.1 | --- | 4.9 | 71.2 | 1.2 | 21.7 | 1.0 | 11980 | .02 | .02 | 1.01 | | | |
| | | 4 | 11.8 | 35.9 | 39.1 | 13.2 | 5.0 | 53.5 | .8 | 26.7 | .8 | 9000 | --- | --- | --- | | | |
| D176639 | 181.0 - 185.0 | 1 | 29.6 | 27.6 | 32.3 | 10.5 | 6.1 | 44.0 | .7 | 37.7 | 1.0 | 7320 | .04 | .13 | .78 | 2120 | 2150 | 2180 |
| | | 2 | --- | 39.2 | 45.9 | 14.9 | 4.0 | 62.5 | 1.0 | 16.2 | 1.4 | 10400 | .06 | .18 | 1.11 | | | |
| | | 3 | --- | 46.1 | 53.9 | --- | 4.7 | 73.5 | 1.2 | 19.0 | 1.7 | 12220 | .07 | .22 | 1.30 | | | |
| | | 4 | 11.9 | 34.6 | 40.4 | 13.1 | 4.8 | 55.1 | .9 | 29.9 | 1.2 | 9160 | --- | --- | --- | | | |

Table 10b.--Proximate, ultimate, Btu, forms-of-sulfur and fusibility of ash analyses of 5 samples from Canyon A coal bed USGS core hole RM-1 SW 1/4 NW 1/4 sec. 33, T. 56 N., R. 72 W., Campbell County, Wyo.

[All analyses except Btu and fusibility of ash in percent. Original moisture content may be slightly more than shown because samples were collected and transported in plastic bags to avoid metal contamination and water was added where necessary to maintain 100 percent humidity within the bag. Form of analyses: 1, as received; 2, moisture free; 3, moisture and ash free; 4, air dried 30-35°C until constant weight achieved. All analyses by U.S. Bureau of Mines, Coal Analysis Section, Pittsburgh, Pa. (---) indicate no data; 1 ft = .305 meters; to convert from degrees Fahrenheit to degrees Centigrade subtract 32° and multiply by 5/9. To convert Btu/lb to Kcal/kg, multiply by 0.5556.]

| | | | Proximate analysis | | | | Ultimate Analysis | | | | | | Forms of sulfur | | | Fusibility of Ash (°F) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample | Depth (ft) | Forms of analysis | Moisture | Volatile matter | Fixed carbon | Ash | Hydrogen | Carbon | Nitrogen | Oxygen | Sulfur | Btu/lb | Sulfate | Pyritic | Organic | Initial deformation | Softening | Fluid |
| D176640 | 187.8 - 196.0 | 1 | 34.0 | 28.1 | 30.6 | 7.3 | 6.7 | 42.9 | 0.6 | 41.8 | 0.7 | 7170 | 0.01 | 0.03 | 0.62 | 2120 | 2150 | 2180 |
| | | 2 | --- | 42.6 | 46.4 | 11.1 | 4.4 | 65.0 | .9 | 17.5 | 1.1 | 10860 | .02 | .05 | .94 | | | |
| | | 3 | --- | 47.9 | 52.1 | --- | 5.0 | 73.1 | 1.0 | 19.7 | 1.2 | 12210 | .02 | .05 | 1.06 | | | |
| | | 4 | 12.4 | 37.3 | 40.6 | 9.7 | 5.2 | 56.9 | .9 | 26.4 | .9 | 9520 | --- | --- | --- | | | |
| D176641 | 195.0 - 198.0 | 1 | 31.8 | 29.2 | 35.3 | 3.7 | 6.7 | 47.3 | .7 | 41.2 | .4 | 7890 | .01 | .02 | .39 | 2400 | 2430 | 2460 |
| | | 2 | --- | 42.8 | 51.8 | 5.4 | 4.6 | 69.4 | 1.0 | 19.0 | .6 | 11570 | .01 | .03 | .57 | | | |
| | | 3 | --- | 45.3 | 54.7 | --- | 4.9 | 73.3 | 1.1 | 20.1 | .6 | 12230 | .02 | .03 | .60 | | | |
| | | 4 | 13.5 | 37.0 | 44.8 | 4.7 | 5.6 | 60.0 | .9 | 28.3 | .5 | 10000 | --- | --- | --- | | | |
| D176642 | 198.0 - 202.0 | 1 | 33.4 | 29.1 | 34.1 | 3.4 | 6.7 | 46.0 | .5 | 43.1 | .3 | 7700 | .01 | .01 | .25 | 2410 | 2440 | 2470 |
| | | 2 | --- | 43.7 | 51.2 | 5.1 | 4.5 | 69.1 | .8 | 20.1 | .5 | 11560 | .02 | .02 | .38 | | | |
| | | 3 | --- | 46.0 | 54.0 | --- | 4.7 | 72.8 | .8 | 21.2 | .5 | 12180 | .02 | .02 | .40 | | | |
| | | 4 | 13.7 | 37.7 | 44.1 | 4.5 | 5.5 | 59.6 | .7 | 29.7 | .3 | 9980 | --- | --- | --- | | | |
| D176644 | 204.9 - 207.9 | 1 | 30.1 | 31.4 | 33.2 | 5.3 | 6.6 | 46.8 | .6 | 40.3 | .4 | 7900 | .01 | .01 | .42 | 2310 | 2340 | 2370 |
| | | 2 | --- | 44.9 | 47.5 | 7.6 | 4.7 | 67.0 | .9 | 19.4 | .6 | 11300 | .01 | .01 | .60 | | | |
| | | 3 | --- | 48.6 | 51.4 | --- | 5.0 | 72.4 | .9 | 21.0 | .6 | 12200 | .02 | .02 | .65 | | | |
| | | 4 | 14.6 | 38.4 | 40.5 | 6.4 | 5.6 | 57.2 | .8 | 29.5 | .5 | 9650 | --- | --- | --- | | | |
| D176645 | 207.9 - 210.3 | 1 | 32.5 | 29.5 | 28.3 | 9.7 | 6.5 | 41.0 | .5 | 41.7 | .6 | 6900 | .01 | .01 | .60 | 2280 | 2320 | 2360 |
| | | 2 | --- | 43.7 | 41.9 | 14.4 | 4.3 | 60.7 | .7 | 19.0 | .9 | 10220 | .01 | .01 | .89 | | | |
| | | 3 | --- | 53.0 | 49.0 | --- | 5.0 | 70.9 | .9 | 22.2 | 1.0 | 11940 | .02 | .02 | 1.04 | | | |
| | | 4 | 13.0 | 38.1 | 36.3 | 12.6 | 5.2 | 52.8 | .7 | 27.9 | .8 | 8900 | --- | --- | --- | | | |

Table 10c.--Proximate, ultimate, Btu, forms-of-sulfur and fusibility of ash analyses of 6 composite samples in part, coal samples from USGS core hole RM-2 SW 1/4 NE 1/4 sec. 32, T. 56 N., R. 72 W., Campbell County, Wyo.

[All analyses except Btu and fusibility of ash in percent. Original moisture content may be slightly more than shown because samples were collected and transported in plastic bags to avoid metal contamination and water was added where necessary to maintain 100 percent humidity within the bag. Form of analyses: 1, as received; 2, moisture free; 3, moisture and ash free; 4, air dried 30-35°C until constant weight achieved. All analyses by U.S. Bureau of Mines, Coal Analysis Section, Pittsburgh, Pa. (---) indicate no data; 1 ft = .305 meters; to convert from degrees Fahrenheit to degrees Centigrade subtract 32° and multiply by 5/9. To convert Btu/lb to Kcal/kg, multiply by 0.5556.]

| | | | Proximate analysis | | | | Ultimate Analysis | | | | | | Forms of sulfur | | | Fusibility of Ash (°F) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample | Depth (ft) | Forms of analysis | Moisture | Volatile matter | Fixed carbon | Ash | Hydrogen | Carbon | Nitrogen | Oxygen | Sulfur | Btu/lb | Sulfate | Pyritic | Organic | Initial deformation | Softening | Fluid |
| **Anderson coal bed 198.4 to 232.6 feet** | | | | | | | | | | | | | | | | | | |
| D177704 | 198.4 - 199.1 | 1 | 29.2 | 28.9 | 28.6 | 13.3 | 6.3 | 41.6 | 0.5 | 37.7 | 0.6 | 7020 | 0.09 | 0.12 | 0.43 | 2130 | 2200 | 2290 |
| | | 2 | --- | 40.8 | 40.4 | 18.8 | 4.3 | 58.8 | .7 | 16.6 | .8 | 9920 | .13 | .17 | .61 | | | |
| | | 3 | --- | 50.3 | 49.7 | --- | 5.3 | 72.3 | .9 | 20.4 | 1.0 | 12210 | .16 | .21 | .75 | | | |
| | | 4 | 10.2 | 36.7 | 36.2 | 16.9 | 5.0 | 52.8 | .6 | 23.9 | .8 | 8920 | --- | --- | --- | | | |
| D177705, D177707 | 199.1 - 232.6 | 1 | 32.2 | 29.5 | 29.6 | 8.7 | 6.7 | 42.6 | .6 | 41.0 | .4 | 7210 | .02 | .02 | .35 | 2215 | 2300 | 2345 |
| | | 2 | --- | 43.5 | 43.7 | 12.8 | 4.6 | 62.8 | .9 | 18.3 | .6 | 10630 | .03 | .03 | .52 | | | |
| | | 3 | --- | 49.9 | 50.1 | --- | 5.3 | 72.1 | 1.0 | 20.9 | .7 | 12200 | .03 | .03 | .59 | | | |
| | | 4 | 10.9 | 36.6 | 36.8 | 10.9 | 5.6 | 52.9 | .7 | 29.4 | .5 | 8960 | --- | --- | --- | | | |
| **Canyon A coal bed 236.5 to 265.2 feet** | | | | | | | | | | | | | | | | | | |
| D177708, D177709 | 236.5 - 246.4 | 1 | 30.2 | 23.5 | 25.3 | 21.0 | 5.9 | 34.6 | .5 | 37.2 | .8 | 5780 | .10 | .14 | .57 | 2350 | 2420 | 2520 |
| | | 2 | --- | 33.7 | 36.2 | 30.1 | 3.6 | 49.6 | .7 | 14.8 | 1.1 | 8280 | .14 | .29 | .82 | | | |
| | | 3 | --- | 48.2 | 51.8 | --- | 5.2 | 70.9 | 1.0 | 21.2 | 1.6 | 11840 | .20 | .29 | 1.17 | | | |
| | | 4 | 11.8 | 29.7 | 32.0 | 26.5 | 4.5 | 43.7 | .6 | 23.7 | 1.0 | 7300 | --- | --- | --- | | | |
| D177710, D177711 | 249.8 - 265.2 | 1 | 34.4 | 28.2 | 33.1 | 4.3 | 6.9 | 44.2 | .5 | 43.7 | .4 | 7420 | .02 | .14 | .25 | 2420 | 2460 | 2520 |
| | | 2 | --- | 43.0 | 50.5 | 6.6 | 4.7 | 67.4 | .8 | 20.0 | .6 | 11310 | .03 | .21 | .38 | | | |
| | | 3 | --- | 46.0 | 54.0 | --- | 5.0 | 72.1 | .8 | 21.4 | .7 | 12100 | .03 | .23 | .41 | | | |
| | | 4 | 19.3 | 34.7 | 40.7 | 5.3 | 5.9 | 54.4 | .7 | 33.2 | .5 | 9130 | --- | --- | --- | | | |
| **Canyon B coal bed 311.2 to 330.6 feet** | | | | | | | | | | | | | | | | | | |
| D177712 | 311.2 - 213.0 | 1 | 33.6 | 27.8 | 33.5 | 5.1 | 6.9 | 45.5 | .5 | 41.4 | .6 | 7640 | .04 | .02 | .56 | 2385 | 2415 | 2435 |
| | | 2 | --- | 41.8 | 50.4 | 7.8 | 4.7 | 68.4 | .8 | 17.4 | .9 | 11500 | .06 | .04 | .85 | | | |
| | | 3 | --- | 45.3 | 54.7 | --- | 5.1 | 74.1 | .9 | 18.9 | 1.0 | 12460 | .06 | .04 | .92 | | | |
| | | 4 | 15.0 | 35.5 | 42.9 | 6.6 | 5.7 | 58.2 | .7 | 28.0 | .8 | 9780 | --- | --- | --- | | | |
| D177713, D177714 | 313.0 - 330.6 | 1 | 34.1 | 27.9 | 33.0 | 5.0 | 6.8 | 44.6 | .6 | 42.7 | .3 | 7440 | .02 | .02 | .29 | 2250 | 2310 | 2340 |
| | | 2 | --- | 42.3 | 50.1 | 7.6 | 4.6 | 67.8 | .8 | 18.7 | .5 | 11300 | .02 | .04 | .45 | | | |
| | | 3 | --- | 45.8 | 54.2 | --- | 4.9 | 73.4 | .9 | 20.3 | .5 | 12240 | .03 | .04 | .48 | | | |
| | | 4 | 14.8 | 36.1 | 42.6 | 6.5 | 5.5 | 57.8 | .7 | 29.1 | .4 | 9640 | --- | --- | --- | | | |

Table 10d.--Proximate, ultimate, Btu, forms-of-sulfur and fusibility of ash analyses of 7 composite samples from Anderson coal bed USGS core hole RM-3 NW 1/4 NW 1/4 sec. 25, T. 56 N. R. 73 W., Campbell County, Wyo.

[All analyses except Btu and fusibility of ash in percent. Original moisture content may be slightly more than shown because samples were collected and transported in plastic bags to avoid metal contamination and water was added where necessary to maintain 100 percent humidity within the bag. Form of analyses: 1, as received; 2, moisture free; 3, moisture and ash free; 4, air dried 30-35°C until constant weight achieved. All analyses by U.S. Bureau of Mines, Coal Analysis Section, Pittsburgh, Pa. (---) indicate no data; 1 ft = .305 meters; to convert from degrees Fahrenheit to degrees Centigrade subtract 32° and multiply by 5/9. To convert Btu/lb to Kcal/kg, multiply by 0.5556.]

| | | | Proximate analysis | | | | Ultimate Analysis | | | | | | Forms of sulfur | | | Fusibility of Ash (°F) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample | Depth (ft) | Forms of analysis | Moisture | Volatile matter | Fixed carbon | Ash | Hydrogen | Carbon | Nitrogen | Oxygen | Sulfur | Btu/lb | Sulfate | Pyritic | Organic | Initial deformation | Softening | Fluid |
| D176502, D176503 | 92.5 - 97.3 | 1 | 31.6 | 29.7 | 30.0 | 8.7 | 6.6 | 42.8 | 0.7 | 40.7 | 0.5 | 7160 | 0.01 | 0.01 | 0.47 | 2130 | 2160 | 2190 |
| | | 2 | --- | 43.4 | 43.9 | 12.7 | 4.5 | 62.6 | 1.0 | 18.4 | .7 | 10470 | .01 | .01 | .69 | | | |
| | | 3 | --- | 49.7 | 50.3 | --- | 5.2 | 71.7 | 1.2 | 21.1 | .8 | 11990 | .02 | .02 | .79 | | | |
| | | 4 | 12.3 | 38.1 | 38.5 | 11.1 | 5.4 | 54.8 | .9 | 27.2 | .6 | 9180 | --- | --- | --- | | | |
| D176504, D176505 | 97.3 - 102.5 | 1 | 30.5 | 31.8 | 29.0 | 8.7 | 6.4 | 43.5 | .8 | 40.1 | .5 | 7310 | .01 | .01 | .49 | 2070 | 2120 | 2170 |
| | | 2 | --- | 45.8 | 41.7 | 12.5 | 4.3 | 62.6 | 1.2 | 18.7 | .7 | 10520 | .01 | .01 | .71 | | | |
| | | 3 | --- | 52.3 | 47.7 | --- | 5.0 | 71.5 | 1.3 | 21.4 | .8 | 12020 | .02 | .02 | .81 | | | |
| | | 4 | 13.8 | 39.4 | 36.1 | 10.7 | 5.2 | 53.9 | 1.0 | 28.6 | .6 | 9060 | --- | --- | --- | | | |
| D176506, D176507 | 102.5 - 107.1 | 1 | 31.5 | 31.9 | 31.8 | 4.8 | 6.6 | 45.5 | .8 | 41.9 | 4 | 7770 | .01 | .01 | .35 | 2340 | 2380 | 2420 |
| | | 2 | --- | 46.6 | 46.4 | 7.0 | 4.5 | 66.4 | 1.2 | 20.3 | .6 | 11340 | .01 | .01 | .51 | | | |
| | | 3 | --- | 50.1 | 49.9 | --- | 4.9 | 71.4 | 1.3 | 21.8 | .6 | 12200 | .02 | .02 | .55 | | | |
| | | 4 | 14.1 | 40.0 | 39.9 | 6.0 | 5.4 | 57.1 | 1.0 | 30.0 | .5 | 9740 | --- | --- | --- | | | |
| D176508, D176509 | 107.1 - 112.0 | 1 | 30.0 | 33.0 | 32.2 | 4.8 | 6.7 | 46.7 | .8 | 40.7 | .3 | 7990 | .01 | .01 | .31 | 2360 | 2400 | 2440 |
| | | 2 | --- | 47.1 | 46.0 | 6.9 | 4.8 | 66.7 | 1.1 | 20.0 | .4 | 11410 | .01 | .01 | .44 | | | |
| | | 3 | --- | 50.6 | 49.4 | --- | 5.2 | 71.6 | 1.2 | 21.5 | .5 | 12250 | .02 | .02 | .48 | | | |
| | | 4 | 13.2 | 40.9 | 40.0 | 5.9 | 5.6 | 57.9 | 1.0 | 29.2 | .4 | 9910 | --- | --- | --- | | | |
| D176510, D176511 | 112.0 - 116.5 | 1 | 31.8 | 29.7 | 33.7 | 4.8 | 6.6 | 46.0 | .7 | 41.6 | .3 | 7750 | .01 | .01 | .25 | 2360 | 2400 | 2440 |
| | | 2 | --- | 43.5 | 49.4 | 7.0 | 4.5 | 67.4 | 1.0 | 19.6 | .4 | 11360 | .01 | .01 | .37 | | | |
| | | 3 | --- | 46.8 | 53.2 | --- | 4.8 | 72.6 | 1.1 | 21.0 | .5 | 12220 | .02 | .02 | .39 | | | |
| | | 4 | 14.2 | 37.3 | 42.5 | 6.0 | 5.4 | 57.8 | .9 | 29.6 | .3 | 9750 | --- | --- | --- | | | |
| D176512, D176513, D176514 | 116.5 - 122.5 | 1 | 33.0 | 30.8 | 31.8 | 4.4 | 6.9 | 45.0 | .8 | 42.6 | .3 | 7560 | .01 | .01 | .32 | 2340 | 2380 | 2420 |
| | | 2 | --- | 46.0 | 47.5 | 6.6 | 4.8 | 67.2 | 1.2 | 19.8 | .4 | 11280 | .01 | .01 | .48 | | | |
| | | 3 | --- | 49.2 | 50.8 | --- | 5.2 | 71.9 | 1.3 | 21.2 | .5 | 12080 | .02 | .02 | .51 | | | |
| | | 4 | 12.8 | 40.0 | 41.5 | 5.7 | 5.7 | 58.6 | 1.0 | 28.6 | .4 | 9840 | --- | --- | --- | | | |
| D176515 | 122.5 - 124.5 | 1 | 29.2 | 30.5 | 16.9 | 23.4 | 5.8 | 32.8 | .5 | 36.9 | .6 | 5520 | .01 | .02 | .59 | 2360 | 2460 | 2540 |
| | | 2 | --- | 43.1 | 23.9 | 33.1 | 3.6 | 46.3 | .7 | 15.5 | .8 | 7800 | .01 | .03 | .83 | | | |
| | | 3 | --- | 64.3 | 35.7 | --- | 5.4 | 69.2 | 1.1 | 23.0 | 1.3 | 11650 | .02 | .04 | 1.24 | | | |
| | | 4 | 10.5 | 38.6 | 21.3 | 29.6 | 4.4 | 41.4 | .7 | 23.1 | .8 | 6990 | --- | --- | --- | | | |

Table 10e.--Proximate, ultimate, Btu, forms-of-sulfur and fusibility of ash analyses of 10 composite, in part, coal samples from USGS core hole RM-4 SW 1/4 SW 1/4 sec. 25, T. 56 N., R. 73 W., Campbell County, Wyo.

[All analyses except Btu and fusibility of ash in percent. Original moisture content may be slightly more than shown because samples were collected and transported in plastic bags to avoid metal contamination and water was added where necessary to maintain 100 percent humidity within the bag. Form of analyses: 1, as received; 2, moisture free; 3, moisture and ash free; 4, air dried 30-35°C until constant weight achieved. All analyses by U.S. Bureau of Mines, Coal Analysis Section, Pittsburgh, Pa. (---) indicate no data; 1 ft = .305 meters; to convert from degrees Fahrenheit to degrees Centigrade subtract 32° and multiply by 5/9. To convert Btu/lb to Kcal/kg, multiply by 0.5556.]

| | | | Proximate analysis | | | | Ultimate Analysis | | | | | | Forms of sulfur | | | Fusibility of Ash (°F) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample | Depth (ft) | Forms of analysis | Moisture | Volatile matter | Fixed carbon | Ash | Hydrogen | Carbon | Nitrogen | Oxygen | Sulfur | Btu/lb | Sulfate | Pyritic | Organic | Initial deformation | Softening | Fluid |
| **Anderson coal bed 129.4 to 167.0 feet** | | | | | | | | | | | | | | | | | | |
| D176799 | 129.4 - 130.0 | 1 | 31.6 | 29.7 | 32.7 | 6.1 | 6.7 | 45.5 | 0.7 | 40.6 | 0.5 | 7790 | 0.01 | 0.02 | 0.44 | 2210 | 2240 | 2270 |
| | | 2 | --- | 43.4 | 47.8 | 8.9 | 4.6 | 66.5 | 1.1 | 18.4 | .7 | 11390 | .01 | .03 | .64 | | | |
| | | 3 | --- | 47.6 | 52.5 | --- | 5.0 | 72.9 | 1.2 | 20.2 | .8 | 12500 | .02 | .03 | .71 | | | |
| | | 4 | 10.5 | 38.9 | 42.8 | 7.8 | 5.3 | 59.6 | 1.0 | 25.7 | .6 | 10200 | --- | --- | --- | | | |
| D176800-D176804 | 130.4 - 163.0 | 1 | 32.8 | 29.2 | 32.2 | 5.8 | 6.8 | 44.8 | .7 | 41.5 | .4 | 7600 | .01 | .01 | .34 | 2340 | 2370 | 2400 |
| | | 2 | --- | 43.5 | 47.9 | 8.6 | 4.7 | 66.7 | 1.0 | 18.4 | .6 | 11310 | .01 | .01 | .51 | | | |
| | | 3 | --- | 47.6 | 52.4 | --- | 5.1 | 73.0 | 1.1 | 20.1 | .7 | 12380 | .02 | .02 | .55 | | | |
| | | 4 | 12.5 | 38.0 | 42.0 | 7.5 | 5.5 | 58.3 | .9 | 27.3 | .5 | 9890 | --- | --- | --- | | | |
| D176805 | 163.0 - 167.0 | 1 | 18.8 | 32.3 | 31.6 | 17.4 | 5.4 | 45.3 | .8 | 30.4 | .7 | 7730 | .01 | .03 | .67 | 2330 | 2360 | 2390 |
| | | 2 | --- | 39.8 | 38.9 | 21.4 | 4.1 | 55.8 | 1.0 | 16.9 | .9 | 9520 | .01 | .04 | .83 | | | |
| | | 3 | --- | 50.6 | 49.5 | --- | 5.2 | 71.0 | 1.3 | 21.5 | 1.1 | 12120 | .02 | .05 | 1.05 | | | |
| | | 4 | 10.6 | 35.6 | 34.6 | 19.2 | 4.8 | 49.9 | .9 | 24.4 | .8 | 8520 | --- | --- | --- | | | |
| **Canyon A coal bed 298.0 to 320.5** | | | | | | | | | | | | | | | | | | |
| D176806 | 298.0 - 299.0 | 1 | 30.8 | 27.6 | 34.5 | 7.1 | 6.2 | 43.9 | .8 | 39.2 | 2.8 | 7400 | .28 | .95 | 1.55 | 2310 | 2340 | 2370 |
| | | 2 | --- | 39.9 | 49.9 | 10.3 | 4.0 | 63.4 | 1.2 | 17.1 | 4.0 | 10690 | .40 | 1.37 | 2.24 | | | |
| | | 3 | --- | 44.4 | 55.6 | --- | 4.5 | 70.7 | 1.3 | 19.0 | 4.5 | 11920 | .45 | 1.53 | 2.50 | | | |
| | | 4 | 10.2 | 35.8 | 44.8 | 9.2 | 4.7 | 57.0 | 1.0 | 24.5 | 3.6 | 9600 | --- | --- | --- | | | |
| D176807 | 299.0 - 303.0 | 1 | 34.2 | 26.7 | 31.9 | 7.2 | 6.7 | 42.7 | .6 | 42.2 | .6 | 7170 | .01 | .02 | .58 | 2020 | 2050 | 2080 |
| | | 2 | --- | 40.6 | 48.5 | 10.9 | 4.4 | 64.9 | .9 | 17.9 | .9 | 10900 | .02 | .03 | .88 | | | |
| | | 3 | --- | 45.6 | 54.4 | --- | 4.9 | 72.9 | 1.0 | 20.1 | 1.0 | 12240 | .02 | .03 | .99 | | | |
| | | 4 | 10.6 | 36.2 | 43.4 | 9.8 | 5.1 | 58.0 | .9 | 25.4 | .8 | 9750 | --- | --- | --- | | | |
| D176808 | 305.0 - 306.0 | 1 | 31.4 | 28.4 | 33.0 | 7.2 | 6.4 | 45.0 | .7 | 39.7 | 1.0 | 7620 | .01 | .02 | 1.00 | 2020 | 2050 | 2080 |
| | | 2 | --- | 41.4 | 48.1 | 10.5 | 4.2 | 65.6 | 1.0 | 17.2 | 1.5 | 11110 | .01 | .03 | 1.46 | | | |
| | | 3 | --- | 46.3 | 53.7 | --- | 4.7 | 73.3 | 1.1 | 19.2 | 1.6 | 12410 | .02 | .03 | 1.63 | | | |
| | | 4 | 12 | 36.5 | 42.3 | 9.2 | 5.1 | 57.8 | .9 | 25.8 | 1.2 | 9790 | --- | --- | --- | | | |
| D176809-D176812 | 306.0 - 320.5 | 1 | 34 | 28 | 33.9 | 4.1 | 6.8 | 45.1 | .8 | 42.9 | .3 | 7530 | .01 | .01 | .29 | 2390 | 2420 | 2450 |
| | | 2 | --- | 42.4 | 51.4 | 6.2 | 4.6 | 68.3 | 1.2 | 19.2 | .5 | 11410 | .02 | .02 | .44 | | | |
| | | 3 | --- | 45.2 | 54.8 | --- | 4.9 | 72.9 | 1.3 | 20.5 | .5 | 12160 | .02 | .02 | .47 | | | |
| | | 4 | 10.8 | 31.8 | 45.9 | 5.5 | 5.3 | 60.9 | 1.0 | 26.9 | .4 | 10170 | --- | --- | --- | | | |
| **Canyon B coal bed 323.0 to 349.0 feet** | | | | | | | | | | | | | | | | | | |
| D176813 | 323.0 - 327.0 | 1 | 34.2 | 27.3 | 33.8 | 4.7 | 6.8 | 44.7 | .6 | 43.0 | .2 | 7430 | .01 | .01 | .22 | 2310 | 2340 | 2370 |
| | | 2 | --- | 41.5 | 51.4 | 7.1 | 4.6 | 67.9 | .9 | 19.1 | .3 | 11290 | .02 | .02 | .36 | | | |
| | | 3 | --- | 44.7 | 55.3 | --- | 4.9 | 73.2 | 1.0 | 20.6 | .3 | 12160 | .02 | .02 | .36 | | | |
| | | 4 | 11.2 | 36.8 | 45.6 | 6.4 | 5.3 | 60.3 | .9 | 26.8 | .3 | 10020 | --- | --- | --- | | | |
| D176814-D176818 | 327.0 - 346.0 | 1 | 35.3 | 27.8 | 33.3 | 3.6 | 6.8 | 44.8 | .7 | 43.9 | .2 | 7530 | .01 | .01 | .20 | 2380 | 2410 | 2440 |
| | | 2 | --- | 43.0 | 51.5 | 5.6 | 4.4 | 69.2 | 1.1 | 19.4 | .3 | 11640 | .02 | .02 | .31 | | | |
| | | 3 | --- | 45.5 | 54.5 | --- | 4.7 | 73.3 | 1.1 | 20.5 | .3 | 12320 | .02 | .02 | .33 | | | |
| | | 4 | 11.2 | 38.2 | 45.6 | 5.0 | 5.2 | 61.5 | 1.0 | 27.0 | .3 | 10340 | --- | --- | --- | | | |
| D176819 | 346.0 - 349.0 | 1 | 31.6 | 30.1 | 30.1 | 8.3 | 6.8 | 44.0 | .7 | 39.6 | .6 | 7650 | .01 | .01 | .54 | 2120 | 2150 | 2180 |
| | | 2 | --- | 44.0 | 44.0 | 12.12 | 4.8 | 64.3 | 1.0 | 16.8 | .9 | 11180 | .01 | .01 | .79 | | | |
| | | 3 | --- | 50.1 | 50.1 | --- | 5.5 | 73.2 | 1.2 | 19.2 | 1.0 | 12730 | .02 | .02 | .90 | | | |
| | | 4 | 9.7 | 39.7 | 39.7 | 10.9 | 5.5 | 58.1 | 1.0 | 23.8 | .7 | 10100 | --- | --- | --- | | | |

Table 10f.--Proximate, ultimate, Btu, forms-of-sulfur and fusibility of ash analyses of 7 composite, in part, coal samples from USGS core hole RM-5 SE 1/4 SE 1/4 sec. 27, T. 56 N., R. 73 W., Campbell County, Wyo.

[All analyses except Btu and fusibility of ash in percent. Original moisture content may be slightly more than shown because samples were collected and transported in plastic bags to avoid metal contamination and water was added where necessary to maintain 100 percent humidity within the bag. Form of analyses: 1, as received; 2, moisture free; 3, moisture and ash free; 4, air dried 30-35°C until constant weight achieved. All analyses by U.S. Bureau of Mines, Coal Analysis Section, Pittsburgh, Pa. (---) indicate no data; 1 ft = .305 meters; to convert from degrees Fahrenheit to degrees Centigrade subtract 32° and multiply by 5/9. To convert Btu/lb to Kcal/kg, multiply by 0.5556.]

| | | | Proximate analysis | | | | Ultimate Analysis | | | | | | Forms of sulfur | | | Fusibility of Ash (°F) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample | Depth (ft) | Forms of analysis | Moisture | Volatile matter | Fixed carbon | Ash | Hydrogen | Carbon | Nitrogen | Oxygen | Sulfur | Btu/lb | Sulfate | Pyritic | Organic | Initial deformation | Softening | Fluid |
| **Anderson coal bed 135.2 to 168.6 feet** | | | | | | | | | | | | | | | | | | |
| D1777715 | 135.2 - 136.2 | 1 | 34.0 | 27.1 | 28.2 | 10.7 | 6.6 | 40.6 | 0.6 | 40.9 | 0.6 | 6900 | 0.02 | 0.02 | 0.58 | 2115 | 2200 | 2250 |
| | | 2 | --- | 41.1 | 42.7 | 16.2 | 4.0 | 61.5 | .9 | 16.2 | .9 | 10450 | .03 | .03 | .88 | | | |
| | | 3 | --- | 49.0 | 51.0 | --- | 5.1 | 73.4 | 1.1 | 19.3 | 1.1 | 12480 | .04 | .04 | 1.05 | | | |
| | | 4 | 15.1 | 34.8 | 36.4 | 13.7 | 5.4 | 52.3 | .8 | 27.0 | .8 | 8870 | --- | --- | --- | | | |
| D177716-D177719 | 136.2 - 165.6 | 1 | 35.5 | 27.6 | 30.9 | 6.0 | 7.0 | 42.4 | .6 | 43.6 | .4 | 7150 | .02 | .11 | .28 | 2255 | 2290 | 2330 |
| | | 2 | --- | 42.8 | 47.9 | 9.3 | 4.7 | 65.7 | .9 | 18.7 | .6 | 11090 | .03 | .17 | .43 | | | |
| | | 3 | --- | 47.2 | 52.8 | --- | 5.2 | 72.5 | 1.0 | 20.6 | .7 | 12220 | .03 | .19 | .48 | | | |
| | | 4 | 15.6 | 36.2 | 40.4 | 7.8 | 5.7 | 55.5 | .8 | 29.7 | .5 | 9360 | --- | --- | --- | | | |
| D177720 | 165.6 - 168.6 | 1 | 35.3 | 24.8 | 24.2 | 15.7 | 6.5 | 34.9 | .3 | 41.7 | .9 | 5910 | .02 | .02 | .83 | 2310 | 2370 | 2420 |
| | | 2 | --- | 38.3 | 37.4 | 24.3 | 4.0 | 53.9 | .5 | 16.0 | 1.4 | 9130 | .03 | .03 | 1.28 | | | |
| | | 3 | --- | 50.6 | 49.4 | --- | 5.3 | 71.2 | .6 | 21.1 | 1.8 | 12060 | .04 | .04 | 1.69 | | | |
| | | 4 | 17.0 | 31.9 | 31.0 | 20.1 | 5.2 | 44.8 | .4 | 28.4 | 1.1 | 7590 | --- | --- | --- | | | |
| **Canyon coal bed 354.9 to 395.5 feet** | | | | | | | | | | | | | | | | | | |
| D177721, D177722 | 354.9 - 360.2 | 1 | 32.5 | 28.7 | 32.9 | 5.9 | 6.6 | 45.1 | .4 | 41.3 | .7 | 7580 | .02 | .02 | .67 | 2345 | 2380 | 2400 |
| | | 2 | --- | 42.5 | 48.7 | 8.7 | 4.4 | 66.8 | .6 | 18.4 | 1.0 | 11230 | .03 | .03 | .99 | | | |
| | | 3 | --- | 46.6 | 53.4 | --- | 4.9 | 73.2 | .6 | 20.1 | 1.1 | 12310 | .03 | .03 | 1.09 | | | |
| | | 4 | 15.4 | 36.1 | 41.1 | 7.4 | 5.5 | 56.6 | .5 | 29.1 | .9 | 9510 | --- | --- | --- | | | |
| D177723 | 360.2 - 361.8 | 1 | 19.1 | 11.7 | 9.8 | 59.4 | 3.3 | 14.2 | .3 | 22.5 | .3 | 2290 | .01 | .07 | .18 | 2880 | 2910+ | --- |
| | | 2 | --- | 14.5 | 12.1 | 73.4 | 1.5 | 17.6 | .4 | 6.8 | .4 | 2830 | .01 | .09 | .22 | | | |
| | | 3 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | | |
| | | 4 | 3.3 | 14.0 | 11.7 | 71.0 | 1.8 | 17.0 | .4 | 9.5 | .3 | 2740 | --- | --- | --- | | | |
| D177724-D177726 | 361.8 - 375.9 | 1 | 32.5 | 26.6 | 29.6 | 11.3 | 6.5 | 40.6 | .7 | 40.6 | .3 | 6880 | .01 | .04 | .27 | 2250 | 2300 | 2350 |
| | | 2 | --- | 39.4 | 43.9 | 16.7 | 4.3 | 60.1 | 1.0 | 17.3 | .4 | 10190 | .01 | .06 | .40 | | | |
| | | 3 | --- | 47.3 | 52.7 | --- | 5.1 | 72.2 | 1.2 | 20.8 | .5 | 12240 | .02 | .07 | .48 | | | |
| | | 4 | 10.0 | 35.4 | 39.6 | 15.10 | 4.9 | 54.1 | .9 | 24.7 | .4 | 9170 | --- | --- | --- | | | |
| D177727-D177729 | 375.9 - 395.5 | 1 | 33.1 | 27.2 | 32.9 | 6.8 | 6.6 | 44.2 | .7 | 41.2 | .5 | 7440 | .01 | .16 | .33 | 2150 | 2200 | 2250 |
| | | 2 | --- | 40.7 | 49.2 | 10.2 | 4.4 | 66.1 | 1.0 | 17.6 | .7 | 11120 | .01 | .24 | .49 | | | |
| | | 3 | --- | 45.3 | 54.7 | --- | 4.9 | 73.5 | 1.2 | 19.6 | .8 | 12380 | .02 | .27 | .55 | | | |
| | | 4 | 10.5 | 36.4 | 44.0 | 9.1 | 5.1 | 59.1 | 1.0 | 25.0 | .7 | 9950 | --- | --- | --- | | | |

Table 10g.--Proximate, ultimate, Btu, forms-of-sulfur and fusibility of ash analyses of 8 composite, in part, coal samples from USGS core hole RM-6 NW 1/4 NE 1/4 sec. 21, T. 56 N., R. 73 W., Campbell County, Wyo.

[All analyses except Btu and fusibility of ash in percent. Original moisture content may be slightly more than shown because samples were collected and transported in plastic bags to avoid metal contamination and water was added where necessary to maintain 100 percent humidity within the bag. Form of analyses: 1, as received; 2, moisture free; 3, moisture and ash free; 4, air dried 30-35°C until constant weight achieved. All analyses by U.S. Bureau of Mines, Coal Analysis Section, Pittsburgh, Pa. (---) indicate no data; 1 ft = .305 meters; to convert from degrees Fahrenheit to degrees Centigrade subtract 32° and multiply by 5/9. To convert Btu/lb to Kcal/kg, multiply by 0.5556.]

| | | | Proximate analysis | | | | Ultimate Analysis | | | | | | Forms of sulfur | | | Fusibility of Ash (°F) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample | Depth (ft) | Forms of analysis | Moisture | Volatile matter | Fixed carbon | Ash | Hydrogen | Carbon | Nitrogen | Oxygen | Sulfur | Btu/lb | Sulfate | Pyritic | Organic | Initial deformation | Softening | Fluid |
| **Anderson coal bed 88.9 to 120.0 feet** | | | | | | | | | | | | | | | | | | |
| D177730 | 88.9 - 90.4 | 1 | 30.9 | 28.9 | 31.2 | 9.0 | 6.5 | 43.3 | 0.7 | 40.0 | 0.5 | 7370 | 0.01 | 0.02 | 0.50 | 2190 | 2220 | 2250 |
| | | 2 | --- | 41.8 | 45.2 | 13.0 | 4.4 | 62.7 | 1.0 | 18.1 | .7 | 10670 | .01 | .03 | .72 | | | |
| | | 3 | --- | 48.1 | 51.9 | --- | 5.1 | 72.0 | 1.2 | 20.9 | .8 | 12260 | .02 | .03 | .83 | | | |
| | | 4 | 10.2 | 37.5 | 40.6 | 11.7 | 5.2 | 56.2 | .9 | 25.3 | .7 | 9580 | --- | --- | --- | | | |
| D177731 | 90.4 - 97.7 | 1 | 33.0 | 28.1 | 30.4 | 8.5 | 6.7 | 42.1 | .7 | 41.4 | .6 | 7140 | .01 | .03 | .56 | 2070 | 2120 | 2180 |
| | | 2 | --- | 41.9 | 45.4 | 12.7 | 4.5 | 62.8 | 1.0 | 18.0 | .9 | 10660 | .01 | .04 | .84 | | | |
| | | 3 | --- | 48.0 | 52.0 | --- | 5.2 | 72.0 | 1.2 | 20.6 | 1.0 | 12210 | .02 | .05 | .96 | | | |
| | | 4 | 12.0 | 36.9 | 40.0 | 11.1 | 5.3 | 55.3 | 1.0 | 26.5 | .8 | 9380 | --- | --- | --- | | | |
| D177732, D177773 | 97.7 - 116.9 | 1 | 31.4 | 29.7 | 31.5 | 7.4 | 6.7 | 44.1 | .7 | 40.6 | .5 | 7500 | .01 | .07 | .40 | 2200 | 2230 | 2260 |
| | | 2 | --- | 43.3 | 45.9 | 10.8 | 4.7 | 64.3 | 1.0 | 18.5 | .7 | 10930 | .01 | .10 | .58 | | | |
| | | 3 | --- | 48.5 | 51.5 | --- | 5.2 | 72.1 | 1.1 | 20.7 | .8 | 12250 | .02 | .11 | .65 | | | |
| | | 4 | 10.3 | 38.9 | 41.1 | 9.7 | 5.3 | 57.7 | 1.0 | 25.7 | .6 | 9810 | --- | --- | --- | | | |
| D177734 | 116.9 - 120.0 | 1 | 33.7 | 27.6 | 32.1 | 6.6 | 6.7 | 43.1 | .7 | 42.2 | .7 | 7260 | .00 | .01 | .64 | 2360 | 2390 | 2440 |
| | | 2 | --- | 41.6 | 48.4 | 10.0 | 4.5 | 65.0 | 1.1 | 18.5 | 1.1 | 10950 | .00 | .02 | .97 | | | |
| | | 3 | --- | 46.2 | 53.8 | --- | 5.0 | 72.2 | 1.2 | 20.5 | 1.2 | 12160 | .00 | .02 | 1.07 | | | |
| | | 4 | 9.9 | 37.5 | 43.7 | 8.9 | 5.2 | 58.5 | 1.0 | 25.5 | .9 | 9850 | --- | --- | --- | | | |
| **Canyon coal bed 256.5 to 302.7 feet** | | | | | | | | | | | | | | | | | | |
| D177735, D177736 | 265.5 - 261.2 | 1 | 34.3 | 26.1 | 31.1 | 8.5 | 6.7 | 41.3 | .4 | 42.6 | .5 | 6990 | .01 | .04 | .47 | 2200 | 2230 | 2260 |
| | | 2 | --- | 39.7 | 47.3 | 12.9 | 4.4 | 62.9 | .6 | 18.4 | .8 | 10640 | .02 | .06 | .72 | | | |
| | | 3 | --- | 45.6 | 54.4 | --- | 5.1 | 72.2 | .7 | 21.2 | .9 | 12220 | .02 | .07 | .82 | | | |
| | | 4 | 9.9 | 35.8 | 42.7 | 11.6 | 5.0 | 56.6 | .6 | 25.5 | .7 | 9590 | | | | | | |
| D177737 | 272.1 - 272.7 | 1 | 25.6 | 21.4 | 21.0 | 32.0 | 5.0 | 28.0 | .6 | 32.9 | 1.5 | 4690 | .25 | .70 | .55 | 2340 | 2460 | 2730 |
| | | 2 | --- | 28.8 | 28.2 | 43.0 | 2.9 | 37.6 | .8 | 13.6 | 2.0 | 6300 | .34 | .94 | .74 | | | |
| | | 3 | --- | 50.5 | 49.5 | --- | 5.1 | 66.0 | 1.4 | 23.9 | 3.5 | 11060 | .59 | 1.65 | 1.30 | | | |
| | | 4 | 7.5 | 26.6 | 26.1 | 39.8 | 3.5 | 34.9 | .8 | 19.1 | 1.9 | 5840 | --- | --- | --- | | | |
| D177738, D177739 | 272.7 - 297.9 | 1 | 31.9 | 26.6 | 32.5 | 9.0 | 6.4 | 43.2 | .8 | 40.3 | .3 | 7270 | .03 | .08 | .20 | 2200 | 2230 | 2260 |
| | | 2 | --- | 39.1 | 47.7 | 13.2 | 4.2 | 63.4 | 1.2 | 17.5 | .4 | 10680 | .04 | .12 | .29 | | | |
| | | 3 | --- | 45.0 | 55.0 | --- | 4.8 | 73.1 | 1.4 | 20.2 | .5 | 12300 | .05 | .14 | .34 | | | |
| | | 4 | 10.8 | 34.9 | 42.5 | 11.8 | 4.9 | 56.6 | 1.0 | 25.3 | .4 | 9530 | --- | --- | --- | | | |
| D177740 | 297.9 - 302.7 | 1 | 32.7 | 26.4 | 36.9 | 4.0 | 6.5 | 46.5 | .6 | 42.2 | .2 | 7790 | .02 | .05 | .18 | 2390 | 2490 | 2545 |
| | | 2 | --- | 39.2 | 54.8 | 5.9 | 4.3 | 69.1 | .9 | 19.5 | .3 | 11580 | .03 | .07 | .27 | | | |
| | | 3 | --- | 41.7 | 58.3 | --- | 4.5 | 73.5 | .9 | 20.7 | .3 | 12310 | .03 | .08 | .28 | | | |
| | | 4 | 15.0 | 33.4 | 46.5 | 5.1 | 5.3 | 58.7 | .8 | 29.8 | .3 | 9840 | --- | --- | --- | | | |

Table 10h.--Proximate, ultimate, Btu, forms-of-sulfur and fusibility of ash of 9 composite, in part, coal samples from USGS core hole RM-7 NE 1/4 NW 1/4 sec. 26, T. 56 N., R. 73 W., Campbell County, Wyo.

[All analyses except Btu and fusibility of ash in percent. Original moisture content may be slightly more than shown because samples were collected and transported in plastic bags to avoid metal contamination and water was added where necessary to maintain 100 percent humidity within the bag. Form of analyses: 1, as received; 2, moisture free; 3, moisture and ash free; 4, air dried 30-35°C until constant weight achieved. All analyses by U.S. Bureau of Mines, Coal Analysis Section, Pittsburgh, Pa. (---) indicate no data; 1 ft = .305 meters; to convert from degrees Fahrenheit to degrees Centigrade subtract 32° and multiply by 5/9. To convert Btu/lb to Kcal/kg, multiply by 0.5556.]

| Sample | Depth (ft) | Forms of analysis | Proximate analysis | | | | Ultimate Analysis | | | | | Btu/lb | Forms of sulfur | | | Fusibility of Ash (°F) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Moisture | Volatile matter | Fixed carbon | Ash | Hydrogen | Carbon | Nitrogen | Oxygen | Sulfur | | Sulfate | Pyritic | Organic | Initial deformation | Softening | Fluid |
| **Anderson coal bed 133.2 to 170.3 feet** | | | | | | | | | | | | | | | | | | |
| D177741 | 133.2 - 134.0 | 1 | 41.5 | 25.3 | 28.3 | 4.9 | 7.2 | 38.8 | 0.4 | 48.3 | 0.4 | 6580 | 0.01 | 0.04 | 0.36 | 2230 | 2255 | 2275 |
| | | 2 | --- | 43.2 | 48.4 | 8.4 | 4.4 | 66.3 | .7 | 19.5 | .7 | 11250 | .02 | .07 | .62 | | | |
| | | 3 | --- | 47.2 | 52.8 | --- | 4.8 | 72.4 | .7 | 21.3 | .7 | 12280 | .02 | .07 | .67 | | | |
| | | 4 | 14.1 | 37.1 | 41.6 | 7.2 | 5.4 | 57.1 | .5 | 29.2 | .6 | 9660 | --- | --- | --- | | | |
| D177742, D177743 | 134.0 - 154.0 | 1 | 33.4 | 29.0 | 32.4 | 5.2 | 6.8 | 44.2 | .6 | 42.8 | 0.4 | 7500 | .02 | .05 | .29 | 2350 | 2375 | 2385 |
| | | 2 | --- | 43.5 | 48.6 | 7.8 | 4.6 | 66.4 | .9 | 19.7 | .6 | 11260 | .03 | .08 | .44 | | | |
| | | 3 | --- | 47.2 | 52.8 | --- | 5.0 | 72.0 | 1.0 | 21.4 | .7 | 12210 | .03 | .08 | .47 | | | |
| | | 4 | 16.5 | 36.3 | 40.7 | 6.5 | 5.7 | 55.4 | .8 | 31.2 | .4 | 9400 | --- | --- | --- | | | |
| D177744, D177745 | 154.0 - 170.3 | 1 | 35.5 | 26.8 | 32.1 | 5.6 | 6.9 | 42.6 | 0.4 | 44.1 | 0.4 | 7180 | .02 | .05 | .33 | 2240 | 2260 | 2275 |
| | | 2 | --- | 41.6 | 49.8 | 8.7 | 4.6 | 66.0 | .6 | 19.4 | .6 | 11130 | .03 | .08 | .51 | | | |
| | | 3 | --- | 45.5 | 54.5 | --- | 5.0 | 72.3 | .7 | 21.3 | .7 | 12190 | .03 | .08 | .56 | | | |
| | | 4 | 17.0 | 34.4 | 41.3 | 7.3 | 5.7 | 54.8 | .5 | 31.2 | .5 | 9240 | --- | --- | --- | | | |
| **Canyon coal bed 286.2 to 329.6 feet** | | | | | | | | | | | | | | | | | | |
| D177746 | 286.2 - 287.3 | 1 | 30.0 | 27.2 | 30.5 | 12.3 | 5.8 | 40.4 | 0.5 | 37.4 | 3.6 | 6910 | .37 | 3.09 | .15 | 1965 | 2040 | 2075 |
| | | 2 | --- | 38.9 | 43.6 | 17.6 | 3.5 | 57.7 | .7 | 15.3 | 5.1 | 9870 | .53 | 4.41 | .21 | | | |
| | | 3 | --- | 47.1 | 52.9 | --- | 4.3 | 70.0 | .9 | 18.6 | 6.2 | 11980 | .64 | 5.36 | .26 | | | |
| | | 4 | 12.9 | 33.9 | 37.4 | 15.3 | 4.5 | 50.3 | .6 | 24.8 | 4.5 | 8590 | --- | --- | --- | | | |
| D177747 | 287.3 - 297.3 | 1 | 33.5 | 27.1 | 34.2 | 5.2 | 6.5 | 44.8 | .7 | 42.4 | .4 | 7550 | .02 | .10 | .25 | 2220 | 2270 | 2285 |
| | | 2 | --- | 40.8 | 51.4 | 7.8 | 4.2 | 67.4 | 1.1 | 19.0 | .6 | 11350 | .03 | .15 | .38 | | | |
| | | 3 | --- | 44.2 | 55.8 | --- | 4.5 | 73.1 | 1.1 | 20.6 | .7 | 12320 | .03 | .16 | .41 | | | |
| | | 4 | 16.3 | 34.1 | 43.1 | 5.5 | 5.3 | 56.4 | .8 | 30.5 | .5 | 9510 | --- | --- | --- | | | |
| D177748, D177749 | 299.2 - 317.7 | 1 | 33.6 | 27.4 | 35.0 | 4.0 | 7.0 | 46.6 | .7 | 41.6 | .1 | 7780 | .02 | .05 | .07 | 2450 | 2485 | 2500 |
| | | 2 | --- | 41.3 | 52.7 | 6.0 | 4.9 | 70.2 | 1.1 | 17.7 | .2 | 11720 | .03 | .08 | .11 | | | |
| | | 3 | --- | 43.9 | 56.1 | --- | 5.2 | 74.7 | 1.1 | 18.8 | .2 | 12470 | .03 | .08 | .11 | | | |
| | | 4 | 13.9 | 35.5 | 45.4 | 5.2 | 5.7 | 60.4 | .9 | 27.6 | .2 | 10080 | --- | --- | --- | | | |
| D177750 | 317.7 - 326.0 | 1 | 34.6 | 26.8 | 33.9 | 4.7 | 6.9 | 44.8 | .6 | 42.6 | .4 | 7570 | .02 | .05 | .31 | 2335 | 2370 | 2390 |
| | | 2 | --- | 41.0 | 51.8 | 7.2 | 4.7 | 68.5 | .9 | 18.1 | .6 | 11570 | .03 | .08 | .47 | | | |
| | | 3 | --- | 44.2 | 55.8 | --- | 5.0 | 73.8 | 1.0 | 19.5 | .7 | 12470 | .03 | .08 | .51 | | | |
| | | 4 | 15.0 | 34.8 | 44.1 | 6.1 | 5.6 | 58.2 | .8 | 28.8 | .5 | 9840 | --- | --- | --- | | | |
| D177751 | 326.0 - 329.6 | 1 | 31.8 | 27.1 | 28.1 | 13.0 | 6.4 | 39.5 | .5 | 40.0 | .6 | 6770 | .02 | .11 | .45 | 2330 | 2370 | 2405 |
| | | 2 | --- | 39.7 | 41.2 | 19.1 | 4.2 | 57.9 | .7 | 17.2 | .9 | 9930 | .03 | .16 | .66 | | | |
| | | 3 | --- | 49.1 | 50.9 | --- | 5.2 | 71.6 | .9 | 21.3 | 1.1 | 12260 | .04 | .20 | .82 | | | |
| | | 4 | 14.3 | 34.0 | 35.3 | 16.4 | 5.3 | 49.6 | .6 | 27.4 | .7 | 8510 | --- | --- | --- | | | |
| **Cook coal bed 369.6 to 382.0** | | | | | | | | | | | | | | | | | | |
| D177752 | 369.6 - 382.0 | 1 | 31.7 | 27.0 | 29.4 | 11.9 | 6.3 | 41.7 | .6 | 39.2 | .3 | 7000 | .02 | .17 | .14 | 2075 | 2180 | 2300 |
| | | 2 | --- | 39.5 | 43.0 | 17.4 | 4.1 | 61.1 | .9 | 16.1 | .4 | 10250 | .03 | .25 | .20 | | | |
| | | 3 | --- | 47.9 | 52.1 | --- | 4.9 | 73.9 | 1.1 | 19.5 | .5 | 12410 | .04 | .30 | .25 | | | |
| | | 4 | 14.9 | 33.6 | 36.7 | 14.8 | 5.2 | 52.0 | .7 | 26.9 | .4 | 8720 | --- | --- | --- | | | |

Table 11.--Weighted average values by hole and coal bed for the analysis shown on tables 7a to 7g, Content of seven trace elements, USGS 1975 Drilling, Campbell County, Wyoming

[All values in ppm. Leaders (---) indicate no data]

| Hole no. | Coal bed | As | F | Hg | Sb | Se | Th | U |
|---|---|---|---|---|---|---|---|---|
| RM-1 | Anderson | 1 | --- | 0.13 | --- | 0.9 | --- | --- |
| | Canyon A | 2 | 65 | .09 | --- | .8 | --- | --- |
| RM-2 | Anderson | 1 | 100 | .10 | --- | .9 | --- | --- |
| | Canyon A | 2 | 75 | .09 | --- | 1.1 | --- | --- |
| | Canyon B | 1 | 50 | .05 | --- | .4 | --- | --- |
| RM-3 | Anderson | | --- | .11 | .3 | 1.3 | --- | --- |
| RM-4 | Anderson | 1 | 50 | .11 | --- | 1.2 | --- | .6 |
| | Canyon A | 2 | 55 | .07 | --- | .7 | --- | .6 |
| | Canyon B | 2 | 50 | --- | --- | .8 | --- | --- |
| RM-5 | Anderson | 2 | 55 | .10 | --- | 1.1 | --- | --- |
| | Canyon | 3 | --- | .08 | --- | .7 | --- | 1.0 |
| RM-6 | Anderson | 3 | 50 | .11 | .3 | 1.5 | --- | --- |
| | Canyon | 4 | 70 | .07 | .3 | 1.2 | --- | 1.0 |
| RM-7 | Anderson | 1 | 50 | .07 | --- | 1.1 | --- | --- |
| | Canyon | 3 | --- | .08 | --- | .8 | --- | --- |
| | Cook | 1 | 60 | .08 | .3 | .9 | --- | 1.2 |

Table 12.--Weighted average values by hole and coal bed for the analyses shown on Tables 8a to 8p, Major and minor oxide and trace element composition as posted on a whole-coal basis, USGS 1975 Drilling, Campbell County, Wyoming

[Leaders (---) indicate no data]

| Hole no. | Coal bed | Si % | Al % | Ca % | Mg % | Na % | K % | Fe % | Mn ppm | Ti % | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| RM-1 | Anderson | 1.2 | 0.74 | 1.5 | 0.259 | 0.126 | 0.040 | 0.30 | 9.7 | 0.047 | --- |
| | Canyon A | .92 | .58 | 1.3 | .276 | .121 | .039 | .24 | 11 | .038 | 390 |
| RM-2 | Anderson | 1.7 | .84 | 1.1 | .284 | .136 | .050 | .20 | --- | .064 | --- |
| | Canyon A | 2.7 | 1.3 | .90 | .285 | .122 | .078 | .31 | --- | .077 | --- |
| | Canyon B | .50 | .31 | .93 | .289 | .112 | .012 | .47 | --- | .017 | --- |
| RM-3 | Anderson | 1.4 | .82 | 1.7 | .326 | .120 | .048 | .31 | 61 | .054 | 1000 |
| RM-4 | Anderson | .92 | .70 | 1.0 | .333 | .161 | .029 | .24 | --- | .063 | --- |
| | Canyon A | .72 | .41 | .92 | .285 | .159 | .017 | .36 | --- | .052 | --- |
| | Canyon B | .74 | .50 | .85 | .274 | .145 | .021 | .41 | --- | .032 | --- |
| RM-5 | Anderson | 1.1 | .54 | .86 | .220 | .125 | .031 | .18 | --- | .042 | --- |
| | Canyon | 2.1 | .71 | .97 | .284 | .141 | .066 | .28 | --- | .048 | --- |
| RM-6 | Anderson | 1.6 | 1.1 | 1.6 | .378 | .231 | .040 | .35 | 71 | .078 | --- |
| | Canyon | 1.8 | 1.0 | 1.1 | .295 | .152 | .081 | .38 | 91 | .053 | --- |
| RM-7 | Anderson | .76 | .48 | 1.1 | .300 | .148 | .015 | .19 | --- | .043 | --- |
| | Canyon | .94 | .53 | 1.2 | .345 | .145 | .026 | .40 | --- | .041 | --- |
| | Cook | 2.6 | 1.0 | .97 | .296 | .114 | .087 | .28 | --- | .065 | --- |

| Hole no. | Coal bed | As ppm | Cu ppm | F ppm | Hg ppm | Li ppm | Pb ppm | Sb ppm | Se ppm | U ppm | Zn ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|
| RM-1 | Anderson | - | 12.0 | --- | 0.13 | --- | --- | --- | 0.9 | 1.0 | 10.3 |
| | Canyon A | 2 | 10.4 | 66 | .09 | --- | --- | --- | .8 | --- | 8.8 |
| RM-2 | Anderson | 1 | 15.1 | 101 | .10 | 3.2 | --- | --- | .9 | --- | 9.5 |
| | Canyon A | 2 | 21.5 | 76 | .09 | --- | --- | --- | 1.1 | --- | 24.5 |
| | Canyon B | 1 | 3.9 | 48 | .05 | --- | --- | --- | .4 | --- | 2.3 |
| RM-3 | Anderson | - | 15.6 | --- | .11 | --- | --- | .3 | 1.3 | --- | 6.5 |
| RM-4 | Anderson | 1 | 12.8 | 48 | .10 | --- | 2.9 | --- | 1.2 | .6 | 13.6 |
| | Canyon A | 2 | 8.2 | 55 | .07 | --- | --- | --- | .7 | .6 | 12.1 |
| | Canyon B | 2 | 5.7 | 46 | --- | --- | --- | --- | .8 | --- | 13.4 |
| RM-5 | Anderson | 2 | 9.3 | 53 | .10 | 3.2 | --- | --- | 1.1 | --- | 6.1 |
| | Canyon | 3 | 8.8 | --- | .08 | --- | --- | --- | .7 | 1.0 | 6.9 |
| RM-6 | Anderson | 3 | 22.4 | 49 | .11 | 7.1 | 4.3 | .3 | 1.5 | --- | 12.2 |
| | Canyon | 4 | 10.9 | 72 | .07 | --- | --- | .3 | 1.2 | 1.0 | 13.7 |
| RM-7 | Anderson | 1 | 11.1 | 51 | .07 | 2.2 | 2.4 | --- | 1.1 | --- | 4.3 |
| | Canyon | 3 | 8.3 | --- | .08 | --- | --- | --- | .8 | --- | 3.9 |
| | Cook | 1 | 9.9 | 59 | .08 | 3.8 | --- | .3 | .9 | 1.2 | 9.3 |

Table 12.--Weighted average values by hole and coal bed for the analyses shown on Tables 8a to 8p, Major and minor oxide and trace element composition as posted on a whole-coal basis, USGS 1975 Drilling, Campbell County, Wyoming--Continued

| Hole no. | Coal bed | B ppm-S | Ba ppm-S | Be ppm-S | Co ppm-S | Cr ppm-S | Ga ppm-S | Mo ppm-S | Nb ppm-S | Ni ppm-S | Sc ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| RM-1 | Anderson | 30 | 500 | --- | 1.5 | 10 | 2 | --- | --- | 5 | 3 |
| | Canyon A | 50 | 200 | --- | 1.0 | 7 | 2 | 1 | --- | 3 | 2 |
| RM-2 | Anderson | 70 | 700 | --- | 1.5 | 10 | 5 | 1 | --- | 3 | 3 |
| | Canyon A | 70 | 500 | --- | --- | 20 | 7 | 3 | --- | 2 | --- |
| | Canyon B | 70 | 700 | --- | --- | 2 | 1.5 | .5 | --- | 2 | --- |
| RM-3 | Anderson | 50 | 700 | --- | 1.5 | 2 | 3 | --- | --- | 3 | 2 |
| RM-4 | Anderson | 50 | 300 | --- | 1.5 | 5 | 2 | --- | --- | 2 | 1.5 |
| | Canyon A | 50 | 500 | --- | 1.5 | 5 | 2 | 1 | --- | 5 | 1.5 |
| | Canyon B | 50 | 300 | --- | --- | 3 | 1 | .5 | --- | 3 | --- |
| RM-5 | Anderson | 70 | 500 | --- | 1.0 | 7 | 3 | 1.5 | --- | 2 | 1.5 |
| | Canyon | 70 | 700 | --- | --- | 7 | 5 | --- | --- | - | 1.5 |
| RM-6 | Anderson | 100 | 700 | --- | 1.5 | 15 | 7 | 1.5 | 3.0 | 5 | 3.0 |
| | Canyon | 70 | 500 | --- | --- | 10 | 3 | 1.5 | --- | 5 | --- |
| RM-7 | Anderson | 70 | 500 | --- | 1.0 | 5 | 2 | --- | --- | 1.5 | 2 |
| | Canyon | 70 | 700 | --- | --- | 7 | 5 | --- | --- | 2 | 1.5 |
| | Cook | 100 | 700 | 1.12 | 1.84 | 15 | 5 | --- | 3.0 | 3 | 3 |

| Hole no. | Coal bed | Sr ppm-S | V ppm-S | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|---|---|
| RM-1 | Anderson | 100 | 20 | 5 | .5 | 15 |
| | Canyon A | 100 | 15 | 7 | .5 | 10 |
| RM-2 | Anderson | 100 | 30 | 5 | .7 | 15 |
| | Canyon A | 300 | 50 | 10 | 1.0 | 20 |
| | Canyon B | 150 | 7 | 3 | .5 | 7 |
| RM-3 | Anderson | 150 | 20 | 5 | .5 | 20 |
| RM-4 | Anderson | 50 | 20 | 3 | .3 | 15 |
| | Canyon A | 70 | 15 | 7 | .5 | 15 |
| | Canyon B | 50 | 10 | - | --- | 10 |
| RM-5 | Anderson | 100 | 20 | 5 | .7 | 20 |
| | Canyon | 150 | 20 | 7 | .7 | 20 |
| RM-6 | Anderson | 150 | 30 | 7 | .7 | 15 |
| | Canyon | 170 | 30 | 7 | .7 | 15 |
| RM-7 | Anderson | 100 | 20 | 5 | .5 | 10 |
| | Canyon | 150 | 20 | 5 | .5 | 15 |
| | Cook | 170 | 30 | 10 | 1.0 | 20 |

Table 13.--Weighted average values by hole and coal bed for the analysis shown on Tables 9a to 9p, Major and Minor oxide and trace element composition of laboratory ash, USGS 1975 drilling, Campbell County, Wyo.

[Leaders (---) indicate no data]

| Hole no. | Coal bed | Ash % | $SiO_2$ % | $Al_2O_3$ % | CaO % | MgO % | $Na_2O$ % | $K_2O$ % | $Fe_2O_3$ % | MnO % | $TiO_2$ % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| RM-1 | Anderson | 8.9 | 22 | 13 | 28 | 5.66 | 2.34 | 0.45 | 5.2 | 0.017 | 0.82 |
| | Canyon A | 8.0 | 21 | 12 | 25 | 6.39 | 2.25 | .51 | 4.7 | .021 | .71 |
| RM-2 | Anderson | 10.4 | 32 | 13 | 17 | 5.05 | 1.99 | .48 | 2.9 | --- | 1.1 |
| | Canyon A | 14.1 | 30 | 14 | 14 | 5.09 | 1.86 | .46 | 3.9 | --- | .80 |
| | Canyon B | 7.3 | 15 | 8.1 | 18 | 6.62 | 2.08 | .20 | 9.4 | --- | .39 |
| RM-3 | Anderson | 10.1 | 22 | 13 | 29 | 6.26 | 1.98 | .39 | 4.7 | .094 | .82 |
| RM-4 | Anderson | 8.5 | 19 | 14 | 19 | 7.17 | 2.87 | .30 | 4.2 | --- | 1.3 |
| | Canyon A | 7.3 | 19 | 11 | 19 | 6.96 | 3.20 | .26 | 6.8 | --- | 1.1 |
| | Canyon B | 7.0 | 19 | 12 | 19 | 7.05 | 3.09 | .31 | 9.3 | --- | .69 |
| RM-5 | Anderson | 7.7 | 27 | 13 | 17 | 5.04 | 2.33 | .35 | 3.5 | --- | 1.0 |
| | Canyon | 11.1 | 22 | 11 | 19 | 6.35 | 2.61 | .35 | 4.9 | --- | .69 |
| RM-6 | Anderson | 13.3 | 26 | 15 | 16 | 4.61 | 2.29 | .39 | 3.7 | .068 | .99 |
| | Canyon | 11.2 | 28 | 15 | 17 | 5.21 | 2.25 | .63 | 5.3 | .13 | .73 |
| RM-7 | Anderson | 7.2 | 22 | 13 | 21 | 6.93 | 2.79 | .25 | 3.8 | --- | .98 |
| | Canyon | 8.8 | 19 | 10 | 20 | 7.15 | 2.45 | .26 | 6.9 | --- | .72 |
| | Cook | 12.6 | 36 | 13 | 15 | 5.02 | 1.69 | .50 | 3.5 | --- | .86 |

| Hole no. | Coal bed | $P_2O_5$ % | $SO_3$ % | Cu ppm | Li ppm | Pb ppm | Zn ppm | B ppm-S | Ba ppm-S | Be ppm-S | Co ppm-S |
|---|---|---|---|---|---|---|---|---|---|---|---|
| RM-1 | Anderson | --- | 4.7 | 135 | — | -- | 74 | 500 | 5,000 | --- | 15 |
| | Canyon A | .95 | 6.5 | 120 | — | -- | 86 | 500 | 3,000 | --- | 15 |
| RM-2 | Anderson | --- | 9.5 | 152 | 26 | -- | 77 | 700 | 7,000 | --- | 15 |
| | Canyon A | --- | 12 | 147 | — | -- | 120 | 700 | 5,000 | --- | 15 |
| | Canyon B | --- | 13 | 53 | — | -- | 31 | 1,000 | 10,000 | --- | — |
| RM-3 | Anderson | 2.6 | 13 | 147 | — | -- | 55 | 700 | 7,000 | --- | 15 |
| RM-4 | Anderson | --- | 13 | 155 | — | 34 | 137 | 700 | 5,000 | --- | 15 |
| | Canyon A | --- | 18 | 115 | — | -- | 158 | 700 | 5,000 | --- | 20 |
| | Canyon B | --- | 11 | 70 | — | -- | 169 | 700 | 5,000 | --- | — |
| RM-5 | Anderson | --- | 13 | 133 | 49 | -- | 60 | 1,000 | 5,000 | --- | 10 |
| | Canyon | --- | 12 | 89 | — | -- | 64 | 1,000 | 10,000 | --- | -- |
| RM-6 | Anderson | --- | 13 | 168 | 54 | 33 | 92 | 700 | 7,000 | --- | 15 |
| | Canyon | --- | 7.5 | 84 | — | -- | 91 | 700 | 5,000 | --- | — |
| RM-7 | Anderson | --- | 11 | 151 | 31 | 33 | 59 | 1,000 | 7,000 | --- | 10 |
| | Canyon | --- | 11 | 83 | — | -- | 40 | 1,000 | 7,000 | --- | — |
| | Cook | --- | 9.8 | 95 | 26 | -- | 53 | 1,000 | 7,000 | --- | 15 |

Table 13.--Weighted average values by hole and coal bed for the analysis shown on Tables 9a to 9p, Major and Minor oxide and trace element composition of laboratory ash, USGS 1975 drilling, Campbell County, Wyo.--Continued

| Hole no. | Coal bed | Cr ppm-S | Ga ppm-S | Mo ppm-S | Nb ppm-S | Ni ppm-S | Sc ppm-S | Sr ppm-S | V ppm-S |
|---|---|---|---|---|---|---|---|---|---|
| RM-1 | Anderson | 70 | 20 | -- | -- | 30 | 20 | 1,500 | 200 |
| | Canyon A | 70 | 20 | 10 | -- | 30 | 20 | 1,500 | 200 |
| RM-2 | Anderson | 70 | 50 | 7 | -- | 20 | 20 | 1,500 | 200 |
| | Canyon A | 100 | 30 | 15 | -- | 50 | 20 | 2,000 | 200 |
| | Canyon B | 50 | 20 | 7 | -- | 50 | -- | 2,000 | 100 |
| RM-3 | Anderson | 70 | 30 | -- | -- | 30 | 20 | 1,500 | 200 |
| RM-4 | Anderson | 50 | 20 | -- | -- | 30 | 20 | 700 | 200 |
| | Canyon A | 70 | 20 | 15 | -- | 50 | 20 | 1,000 | 200 |
| | Canyon B | 30 | 15 | 7 | -- | 50 | -- | 700 | 100 |
| RM-5 | Anderson | 70 | 30 | 15 | -- | 30 | 20 | 1,500 | 200 |
| | Canyon | 50 | 30 | -- | -- | -- | 15 | 2,000 | 150 |
| RM-6 | Anderson | 100 | 50 | 15 | 20 | 30 | 30 | 1,000 | 300 |
| | Canyon | 70 | 30 | 20 | -- | 50 | -- | 1,500 | 200 |
| RM-7 | Anderson | 70 | 30 | -- | -- | 20 | 30 | 1,500 | 300 |
| | Canyon | 70 | 30 | -- | -- | 20 | 15 | 2,000 | 200 |
| | Cook | 100 | 30 | -- | 30 | 30 | 30 | 2,000 | 200 |

| Hole no. | Coal bed | Y ppm-S | Yb ppm-S | Zr ppm-S |
|---|---|---|---|---|
| RM-1 | Anderson | 50 | 5 | 150 |
| | Canyon A | 70 | 5 | 150 |
| RM-2 | Anderson | 50 | 7 | 150 |
| | Canyon A | 50 | 7 | 150 |
| | Canyon B | 50 | 7 | 100 |
| RM-3 | Anderson | 30 | 5 | 150 |
| RM-4 | Anderson | 30 | 3 | 150 |
| | Canyon A | 70 | 7 | 200 |
| | Canyon B | --- | - | 150 |
| RM-5 | Anderson | 50 | 5 | 150 |
| | Canyon | 50 | 7 | 150 |
| RM-6 | Anderson | 50 | 7 | 150 |
| | Canyon | 50 | 7 | 150 |
| RM-7 | Anderson | 70 | 7 | 150 |
| | Canyon | 50 | 5 | 150 |
| | Cook | 100 | 7 | 200 |

Table 14. Weighted average values by hole and coal bed for proximate, ultimate, Btu, forms of sulfur and fusibility of ash analysis shown on Tables 10a to 10h; USGS 1975 Drilling, Campbell County, Wyo.

[All analyses except Btu and fusibility of ash in percent. Original moisture content may be slightly more than shown because samples were collected and transported in plastic bags to avoid metal contamination and water was added where necessary to maintain 100 percent humidity within the bag. Form of analyses: 1, as received; 2, moisture free; 3, moisture and ash free; 4, air dried 30-35°C until constant weight achieved. All analyses by U.S. Bureau of Mines, Coal Analysis Section, Pittsburgh, Pa. (---) indicate no data; 1 ft = .305 meters; to convert from degrees Fahrenheit to degrees Centigrade subtract 32° and multiply by 5/9. To convert Btu/lb to Kcal/kg, multiply by 0.5556.]

| | | | Proximate analysis | | | | Ultimate Analysis | | | | | | Forms of sulfur | | | Fusibility of Ash (°F) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hole no. | Coal bed | Forms of analysis | Moisture | Volatile matter | Fixed carbon | Ash | Hydrogen | Carbon | Nitrogen | Oxygen | Sulfur | Btu/lb | Sulfate | Pyritic | Organic | Initial deformation | Softening | Fluid |
| RM-1 | Anderson | 1 | 32.0 | 29.9 | 32.4 | 5.7 | 6.7 | 44.8 | 0.6 | 41.7 | 0.4 | 7563 | 0.01 | 0.02 | 0.39 | 2280 | 2310 | 2340 |
| | | 2 | --- | 44.0 | 47.7 | 8.4 | 4.6 | 65.9 | .9 | 19.5 | .6 | 11120 | .02 | .03 | .57 | | | |
| | | 3 | --- | 48.0 | 52.0 | --- | 5.1 | 71.9 | 1.0 | 21.3 | .7 | 12140 | .02 | .04 | .62 | | | |
| | | 4 | 12.6 | 38.5 | 41.7 | 7.3 | 5.5 | 57.6 | .8 | 28.8 | .5 | 9728 | --- | --- | --- | | | |
| | Canyon A | 1 | 32.6 | 29.2 | 32.4 | 5.7 | 6.7 | 44.8 | .6 | 41.7 | .5 | 7507 | .01 | .02 | .46 | 2300 | 2330 | 2360 |
| | | 2 | --- | 43.4 | 48.1 | 8.5 | 4.5 | 66.5 | .9 | 18.8 | .7 | 11140 | .01 | .03 | .69 | | | |
| | | 3 | --- | 47.4 | 52.6 | --- | 4.9 | 72.7 | 1.0 | 20.6 | .8 | 12180 | .02 | .03 | .75 | | | |
| | | 4 | 13.3 | 37.6 | 41.6 | 7.4 | 5.4 | 57.6 | .8 | 28.1 | .6 | 9657 | --- | --- | --- | | | |
| RM-2 | Anderson | 1 | 32.1 | 29.5 | 29.6 | 8.8 | 6.7 | 42.6 | .6 | 40.9 | .4 | 7206 | .02 | .02 | .35 | 2180 | 2210 | 2240 |
| | | 2 | --- | 43.5 | 43.6 | 13.0 | 4.6 | 62.7 | .9 | 18.2 | .6 | 10620 | .03 | .03 | .52 | | | |
| | | 3 | --- | 49.9 | 50.1 | --- | 5.3 | 72.1 | 1.0 | 20.9 | .7 | 12200 | .04 | .04 | .60 | | | |
| | | 4 | 10.9 | 36.6 | 36.8 | 11.0 | 5.6 | 52.9 | .7 | 29.3 | .5 | 8939 | --- | --- | --- | | | |
| | Canyon A | 1 | 32.8 | 26.4 | 30.0 | 10.8 | 6.5 | 40.4 | .5 | 41.2 | .6 | 6778 | .05 | .14 | .38 | 2390 | 2440 | 2520 |
| | | 2 | --- | 39.2 | 44.7 | 16.1 | 4.3 | 60.1 | .7 | 17.9 | .8 | 10080 | .08 | .21 | .56 | | | |
| | | 3 | --- | 46.7 | 53.3 | --- | 5.1 | 71.7 | .9 | 21.3 | 1.0 | 12120 | .09 | .25 | .67 | | | |
| | | 4 | 16.4 | 32.7 | 37.3 | 13.6 | 5.4 | 50.2 | .7 | 29.5 | .7 | 8413 | --- | --- | --- | | | |
| | Canyon B | 1 | 34.1 | 27.9 | 33.0 | 5.0 | 6.8 | 44.7 | .6 | 42.6 | .3 | 7458 | .02 | .02 | .32 | 2265 | 2325 | 2350 |
| | | 2 | --- | 42.3 | 50.1 | 7.6 | 4.6 | 67.8 | .9 | 18.7 | .5 | 11310 | .03 | .03 | .48 | | | |
| | | 3 | --- | 45.8 | 54.2 | --- | 5.0 | 73.3 | 1.0 | 20.2 | .5 | 12240 | .04 | .03 | .52 | | | |
| | | 4 | 14.8 | 36.0 | 42.6 | 6.5 | 5.5 | 57.8 | .7 | 29.0 | .4 | 9652 | --- | --- | --- | | | |
| RM-3 | Anderson | 1 | 31.3 | 31.1 | 30.7 | 6.8 | 6.6 | 44.4 | .8 | 41.1 | .4 | 7491 | .01 | .01 | .38 | 2270 | 2310 | 2350 |
| | | 2 | --- | 45.3 | 44.8 | 9.9 | 4.5 | 64.6 | 1.1 | 19.3 | .6 | 10910 | .01 | .02 | .55 | | | |
| | | 3 | --- | 50.3 | 49.7 | --- | 5.0 | 71.7 | 1.2 | 21.4 | .6 | 12110 | .02 | .02 | .61 | | | |
| | | 4 | 13.2 | 39.3 | 38.9 | 8.5 | 5.4 | 56.0 | 1.0 | 28.6 | .5 | 9466 | --- | --- | --- | | | |
| RM-4 | Anderson | 1 | 31.3 | 29.5 | 32.1 | 7.1 | 6.6 | 44.2 | .7 | 39.6 | .4 | 7617 | .01 | .01 | .38 | 2340 | 2370 | 2400 |
| | | 2 | --- | 43.0 | 46.8 | 10.3 | 4.5 | 64.3 | 1.0 | 17.2 | .6 | 11080 | .01 | .02 | .55 | | | |
| | | 3 | --- | 47.9 | 52.1 | --- | 5.0 | 71.7 | 1.2 | 19.2 | .7 | 12350 | .02 | .02 | .61 | | | |
| | | 4 | 12.3 | 37.8 | 41.2 | 8.8 | 5.4 | 57.4 | .9 | 27.0 | .5 | 9747 | --- | --- | --- | | | |
| | Canyon A | 1 | 33.8 | 27.7 | 33.5 | 5.0 | 6.7 | 44.6 | .8 | 42.4 | .5 | 7457 | .02 | .06 | .44 | 2300 | 2330 | 2360 |
| | | 2 | --- | 41.9 | 50.6 | 7.6 | 4.5 | 67.3 | 1.1 | 18.8 | .8 | 11260 | .03 | .09 | .67 | | | |
| | | 3 | --- | 45.3 | 54.7 | --- | 4.9 | 72.8 | 1.2 | 20.3 | .8 | 12180 | .04 | .10 | .72 | | | |
| | | 4 | 10.8 | 33.1 | 45.2 | 6.7 | 5.2 | 60.0 | 1.0 | 26.4 | .7 | 10041 | --- | --- | --- | | | |
| | Canyon B | 1 | 34.7 | 28.0 | 33.0 | 4.3 | 6.8 | 44.7 | .7 | 43.3 | .2 | 7528 | .01 | .01 | .24 | 2340 | 2370 | 2400 |
| | | 2 | --- | 42.9 | 50.6 | 6.6 | 4.5 | 68.4 | 1.0 | 19.0 | .4 | 11530 | .02 | .02 | .37 | | | |
| | | 3 | --- | 45.9 | 54.1 | --- | 4.8 | 73.3 | 1.1 | 20.4 | .4 | 12340 | .02 | .02 | .40 | | | |
| | | 4 | 11.0 | 38.2 | 44.9 | 5.9 | 5.3 | 60.9 | 1.0 | 26.6 | .3 | 10263 | --- | --- | --- | | | |

Table 14. Weighted average values by hole and coal bed for proximate, ultimate, Btu, forms of sulfur and fusibility of ash analysis shown on Tables 10a to 10h; USGS 1975 Drilling, Campbell County, Wyo.--Continued

| Hole no. | Coal bed | Forms of analysis | Proximate analysis | | | | Ultimate Analysis | | | | | Btu/lb | Forms of sulfur | | | Fusibility of Ash (°F) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Moisture | Volatile matter | Fixed carbon | Ash | Hydrogen | Carbon | Nitrogen | Oxygen | Sulfur | | Sulfate | Pyritic | Organic | Initial deformation | Softening | Fluid |
| RM-5 | Anderson | 1 | 35.4 | 27.3 | 30.2 | 7.0 | 6.9 | 41.7 | 0.6 | 43.3 | 0.5 | 7031 | 0.02 | 0.10 | 0.34 | 2260 | 2300 | 2340 |
| | | 2 | --- | 42.3 | 46.8 | 10.9 | 4.7 | 64.5 | .9 | 18.4 | .7 | 10890 | .03 | .15 | .52 | | | |
| | | 3 | --- | 47.5 | 52.5 | --- | 5.2 | 72.4 | 1.0 | 20.6 | .8 | 12220 | .03 | .17 | .59 | | | |
| | | 4 | 15.7 | 35.8 | 39.4 | 9.1 | 5.6 | 54.4 | .8 | 29.5 | .6 | 9186 | --- | --- | --- | | | |
| | Canyon | 1 | 32.2 | 26.5 | 30.7 | 10.6 | 6.4 | 41.7 | .6 | 40.2 | .5 | 7034 | .01 | .10 | .35 | 2240 | 2290 | 2340 |
| | | 2 | --- | 39.1 | 45.3 | 15.6 | 4.2 | 61.5 | 1.0 | 17.0 | .7 | 10380 | .02 | .14 | .51 | | | |
| | | 3 | --- | 46.3 | 53.7 | --- | 5.0 | 72.9 | 1.1 | 20.2 | .8 | 12290 | .02 | .17 | .60 | | | |
| | | 4 | 10.6 | 35.0 | 40.7 | 13.7 | 4.9 | 55.2 | .9 | 24.7 | .6 | 9304 | --- | --- | --- | | | |
| RM-6 | Anderson | 1 | 32.0 | 29.1 | 31.3 | 7.7 | 6.7 | 43.5 | .7 | 40.9 | .5 | 7385 | .00 | .05 | .47 | 2185 | 2215 | 2255 |
| | | 2 | --- | 42.7 | 46.0 | 11.3 | 4.6 | 63.9 | 1.0 | 18.4 | .8 | 10860 | .00 | .08 | .69 | | | |
| | | 3 | --- | 48.2 | 51.8 | --- | 5.2 | 72.1 | 1.2 | 20.7 | .9 | 12230 | .00 | .09 | .77 | | | |
| | | 4 | 10.7 | 38.2 | 41.1 | 10.0 | 5.3 | 57.1 | 1.0 | 25.8 | .7 | 9701 | --- | --- | --- | | | |
| | Canyon | 1 | 32.2 | 26.4 | 32.7 | 8.6 | 6.4 | 43.1 | .7 | 40.7 | .3 | 7259 | .03 | .08 | .24 | 2230 | 2265 | 2310 |
| | | 2 | --- | 39.0 | 48.3 | 12.8 | 4.2 | 63.6 | 1.1 | 17.8 | .5 | 10710 | .04 | .12 | .35 | | | |
| | | 3 | --- | 44.7 | 55.3 | --- | 4.8 | 72.9 | 1.2 | 20.5 | .6 | 12280 | .05 | .14 | .40 | | | |
| | | 4 | 11.2 | 34.7 | 42.8 | 11.3 | 4.9 | 56.5 | .9 | 25.8 | .5 | 9517 | --- | --- | --- | | | |
| RM-7 | Anderson | 1 | 34.5 | 28.0 | 32.2 | 5.4 | 6.9 | 43.4 | .5 | 43.5 | .4 | 7339 | .02 | .05 | .31 | 2300 | 2320 | 2335 |
| | | 2 | --- | 42.7 | 49.1 | 8.2 | 4.6 | 66.2 | .8 | 19.6 | .6 | 11200 | .03 | .08 | .47 | | | |
| | | 3 | --- | 46.5 | 53.5 | --- | 5.0 | 72.1 | .8 | 21.3 | .7 | 12210 | .03 | .08 | .51 | | | |
| | | 4 | 16.7 | 35.5 | 41.0 | 6.9 | 5.7 | 55.2 | .7 | 31.2 | .4 | 9335 | --- | --- | --- | | | |
| | Canyon | 1 | 33.5 | 27.2 | 33.9 | 5.4 | 6.8 | 45.0 | .7 | 41.8 | .4 | 7573 | .03 | .14 | .20 | 2350 | 2385 | 2400 |
| | | 2 | --- | 40.9 | 51.0 | 8.1 | 4.6 | 67.8 | 1.0 | 18.0 | .5 | 11390 | .04 | .21 | .30 | | | |
| | | 3 | --- | 44.5 | 55.5 | --- | 5.0 | 73.8 | 1.1 | 19.6 | .6 | 12400 | .05 | .23 | .32 | | | |
| | | 4 | 14.7 | 34.9 | 43.5 | 6.7 | 5.5 | 57.8 | .8 | 28.5 | .5 | 9721 | --- | --- | --- | | | |