

MISCELLANEOUS ANALYSES OF COAL SAMPLES FROM VARIOUS FIELDS OF THE UNITED STATES.

INTRODUCTION.

In connection with the examination of various coal fields of the United States during the year 1912 a large number of coal analyses were made for the purpose of determining the value of the land underlain by the particular coal bed sampled, in case the land is a part of the public domain, and also to furnish information to the general public concerning the fuel resources of the country, regardless of whether the coal is in the public domain or in lands of private ownership.

Most of these analyses will be published in the descriptions of the fields to which they pertain, but such reports are necessarily delayed until all the data gathered in the field have been thoroughly digested, and consequently they may not appear for several months or even a year. In order, however, to make the analyses immediately available they have been grouped and are inserted here in advance of the appearance of the reports to which they relate. On account of this method of publication it is impossible to describe the samples adequately and to discuss and compare the analyses, but it is believed that enough data are given to make them intelligible, and it is to be hoped that their value to the public in general will be such as to warrant advance publication.

Many of the samples were collected during the survey for classification of some of the western fields where mining has not been begun or has attained so slight a development as to render it negligible. In these fields it is difficult, if not impossible, to secure fresh material, and hence the analyses show the coal to be of lower than its actual grade. Therefore these analyses should be taken with considerable allowance, and no important development should be based upon them until they have been verified or disproved by the analyses of freshly mined coal. The analyses of weathered samples are of value only until they can be supplanted by more reliable results.

In taking a sample of coal for analysis the geologist is instructed to make every endeavor to procure fresh unweathered material. He is supposed to face up the bed in the mine or prospect until fresh

material is available, and then to obtain his sample by making a uniform cut across the bed from roof to floor, including all such benches and partings as an experienced and careful miner would include in commercial coal and throwing out such impurities as would certainly be excluded in practical operation. He is supposed to cut sufficient coal to give at least 6 pounds per foot of coal bed sampled. The sample is hastily pulverized in the mine until it will pass through a $\frac{1}{2}$ -inch mesh, and then is quartered down until about 4 pounds remain. This is placed in a galvanized-iron can, sealed with adhesive tape or paraffin, and mailed to the laboratory for analysis. The sampling is done on the principle that a coal mine should be sampled as carefully as a gold mine and that the sample should be even more carefully handled after it has been taken. The object of sealing is to prevent change in the moisture content, so that the coal may reach the laboratory in practically the same condition that it exists in the mine. Coal is a very unstable substance, and great care must be exercised to prevent oxidation in the course of preparation and in transit. It is also important that the sample should consist of neither the best nor the poorest coal, but that it should be representative of the output of the mine, if one is in operation, or, if the field is undeveloped, it should represent as nearly as possible the merchantable coal that may be secured at some time in the future when mining is carried on.

Although the aim of the geologist in obtaining a sample by the method specified above is to obtain coal that is representative of the output of the mine, practical experience has shown that this is seldom or never accomplished. Almost invariably the sample obtained in the mine contains a lower percentage of impurities than does the coal which reaches the consumer. This is largely due to carelessness in mining and handling and probably could be largely eliminated were the conditions of mining more nearly ideal. By comparing a large number of samples taken in a mine with those taken at the point of consumption it has been found that there is a fairly constant though small difference in the percentage of moisture, ash, and sulphur, and that almost invariably the amount of these substances in the mine sample is less than it is in the merchantable coal. For this reason a small amount should be added, especially to the ash given in the accompanying table, to correctly represent the ash in merchantable coal from the same mine.

During the early stages of land classification all the analytical work was done by the Geological Survey, but with the establishment of a Bureau of Mines "the analyzing and testing of coals, lignites, and other mineral-fuel substances" of the United States passed by law to that bureau. Accordingly all the coal analyses listed in this paper are credited to the Bureau of Mines. Although the analytical work has passed from one bureau to another, the laboratory and

many of the chemists in the work have remained the same and consequently the results are strictly comparable.

In the table, the analyses are given in four forms, marked A, B, C, and D. Analysis A represents the sample as it comes from the mine. This form is not well suited for a comparison of one coal with another because the amount of moisture in the sample as it comes from the mine is largely a matter of accident, and consequently analyses of the same coal expressed in this form may vary as widely as the analyses of coal from different beds or from different fields. Analysis B represents the sample after it has been dried at a temperature a little above the normal until its weight becomes constant. This form of analysis probably presents the coal in its most stable condition and one approaching most closely its condition as it reaches the market. Therefore it is the form best adapted to the general purposes of comparison. Analysis C represents the theoretical condition of the coal after all the moisture has been eliminated. Analysis D represents the coal after all moisture and ash have been theoretically removed. This is supposed to represent the true coal substance, free from the most significant impurities. Forms C and D are obtained from the others merely by recalculation. They should not be used in comparison, for they represent theoretical substances that do not exist.

In the analytical work it is not possible to determine the proximate constituents of coal or lignite with the same degree of accuracy as the ultimate constituents. Therefore the air-drying loss, moisture, volatile matter, fixed carbon, and ash are given to one decimal place only; whereas the ash (in the ultimate analysis), sulphur, hydrogen, carbon, nitrogen, and oxygen are given to two decimal places. The determination of the calorific value to individual units is not reliable, hence in the column headed "Calories" the values are given to the nearest five units and in the column headed "British thermal units" they are given to the nearest tens, as the value of a British thermal unit is about one-half that of a calorie.

CLASSIFICATION OF COAL.

The classification of coal into various grades, such as bituminous, semibituminous, and lignite, is arbitrary and not at all satisfactory, but it is in common use in the United States and it seems desirable to give the class for each sample, because from the analysis one could not always determine this important point. The classes generally used in the United States are as follows: Anthracite, semianthracite, semibituminous, bituminous, subbituminous, lignite.

Anthracite.—This coal is generally well known, but in a systematic classification it is generally defined as a hard coal having a fuel ratio

(fixed carbon divided by volatile matter) of not less than 10. Most of this coal comes from the anthracite fields of western Pennsylvania, but small areas are known in some of the Western States where the coal has been changed to anthracite by the heat and pressure of masses of igneous rock.

Semianthracite.—This class of coal has a fuel ratio ranging from 6 to 10. There is only a small amount of this coal in the United States, found in local basins or in close proximity to igneous rocks.

Semibituminous.—This class is of great commercial importance, but is not widely distributed. Its fuel ratio ranges from 3 to 6. It is the best steam coal in the country, and some of it can be utilized in the manufacture of coke. The centers of production are the Pocahontas and New River fields of Virginia and West Virginia, Georges Creek field of Maryland, Clearfield field of Pennsylvania, and the western end of the Arkansas field in the vicinity of Fort Smith. Though small areas containing this grade of coal have been found in Washington and Colorado, the amount of coal in these fields is small.

Bituminous.—This is the most important grade of coal in the country and includes most of the coals east of the Rocky Mountains. In the Western States there are large areas of bituminous coal, such as the Trinidad-Raton field of Colorado and New Mexico; the Grand Hogback field of Colorado; the Book Cliffs field of Utah, Rock Springs, Kemmerer, and Black Hills fields of Wyoming; the Great Falls field of Montana; and many districts of Washington. This grade furnishes most of the coking coal of the country, and it is largely sold for steam raising and domestic use.

Subbituminous.—The term "subbituminous" has been adopted by the Geological Survey for what has generally been called "black lignite." The latter term is objectionable, for the reason that the coal is not lignitic in the sense of being woody, and the use of the term seems to imply that the coal is little better than the brown, woody lignite of North Dakota, whereas many of the coals of this class closely approach the lowest grade of bituminous coal. In fact, it is extremely difficult to separate this class from the one below and the one above. It is generally distinguished from the lignite by its color and freedom from apparent woody texture and from bituminous coal by the slacking it undergoes when exposed to the weather. As the latter is an important difference in commercial use, it has been adopted by the Geological Survey as a criterion for the separation of subbituminous and bituminous coals.

Subbituminous coal is found in most of the western fields, being well known in the field about Boulder and Denver and in North Park, Colo.; Gallup, N. Mex.; Hanna, Douglas, Sheridan, and the Bighorn Basin, Wyo.; Red Lodge and Musselshell, Mont.; and in many of the districts of Washington and Oregon.

Lignite.—As used by the Geological Survey this term is restricted to the coals that are distinctly brown and generally woody. They are intermediate in quality between peat and subbituminous coal. Lignite is abundant in the North in eastern Montana and North Dakota and in the northwest corner of South Dakota. In the South it is present in all of the Gulf States, but it has been developed commercially only in Texas.

ANALYSES.

[Made by the United States Bureau of Mines. A. C. Fieldner, chemist in charge.]

ALABAMA.

SHELBY COUNTY.

Name of mine and location.	Collector.	Coal bed and kind of coal.	Location.				Thickness.	
			Quarter.	S.	T.	R.	Coal bed.	Part sampled.
Mine of Montevallo-Shelby Coal Co., Straven.	Chas. Butts.....	Upper Straven, bituminous.	SW..	7	21 S..	3 W..	<i>Ft. in.</i> 4 10½	<i>Ft. in.</i> 3 ½
Do.....	do.....	do.....	SW..	7	21 S..	3 W..	4 10½	1 1½

COLORADO.

MOFFAT COUNTY.

Battle Era mine of J. I. Brown, 7 miles northwest of Axial.	E. E. Hancock....	Battle Era, bituminous.	NW..	14	4 N..	94 W..	11 6	11
Mine of Ed. Collom, 5½ miles northwest of Axial.	do.....	do.....	SW..	13	4 N..	94 W..	13 6	13 6
Mine of Joseph Collom, 1½ miles south of Axial.	do.....	Collom, bituminous.	NE..	2	3 N..	93 W..	20 1½	8 11
Shaver mine, 2 miles east of Axial.	do.....	Shaver, bituminous.	NW..	31	4 N..	92 W..	13 9	13 9

IDAHO.

FREMONT COUNTY.

Brown Bear mine of Dick Hillman, 10 miles southwest of Haden.	E. G. Woodruff...	Bituminous...	SE...	25	5 N..	43 E..	5 3	5
Horseshoe mine (abandoned), 10 miles southwest of Haden.	do.....	do.....	NW..	6	4 N..	44 E..	11 1	9 6

* This small air-drying loss indicates that the sample was somewhat weathered.

ANALYSES.

[Made by the United States Bureau of Mines. A. C. Fieldner, chemist in charge.]

ALABAMA.

SHELBY COUNTY.

Laboratory No.	Air-drying loss.	Form of analysis.	Proximate.				Ultimate.					Heating value.	
			Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Calories.	British thermal units.
14391	1.0	A.....	3.1	35.6	53.3	8.0	0.59	.....	.....	.....	.....	7,320	13,170
		B.....	2.1	36.0	53.9	8.0	.60	.....	.....	.....	.....	7,390	13,310
		C.....	.....	36.8	55.0	8.2	.61	.....	.....	.....	.....	7,550	13,590
		D.....	40.1	59.9	.....	.....	.66	.....	.....	.....	.....	8,225	14,810
14392	1.4	A.....	3.6	36.8	53.2	6.4	1.10	.....	.....	.....	.....	7,505	13,510
		B.....	2.3	37.3	53.9	6.5	1.12	.....	.....	.....	.....	7,610	13,700
		C.....	.....	38.2	55.1	6.7	1.14	.....	.....	.....	.....	7,785	14,010
		D.....	40.9	59.1	.....	.....	1.22	.....	.....	.....	.....	8,340	15,010

COLORADO.

MOFFAT COUNTY.

14528	e1.3	A.....	14.7	36.6	42.6	6.12	0.89	5.54	59.06	1.33	27.06	5,635	10,140
		B.....	13.6	37.1	43.1	6.20	.90	5.47	59.84	1.35	26.24	5,710	10,270
		C.....	.....	42.9	49.9	7.17	1.04	4.58	69.21	1.56	16.44	6,500	11,880
		D.....	.....	46.3	53.7	.....	1.12	4.93	74.55	1.68	17.72	7,110	12,800
14529	e2.0	A.....	14.8	38.7	42.7	3.82	.66	5.87	61.49	1.17	26.99	5,990	10,780
		B.....	13.1	39.5	43.5	3.90	.67	5.77	62.74	1.19	25.73	6,110	11,000
		C.....	.....	45.4	50.1	4.49	.78	4.96	72.21	1.37	16.19	7,035	12,660
		D.....	.....	47.5	52.5	.....	.82	5.19	75.60	1.43	16.96	7,365	13,260
14543	e2.1	A.....	11.9	40.6	45.3	2.2	.32	.....	.....	.....	.....	6,450	11,610
		B.....	10.0	41.5	46.2	2.3	.33	.....	.....	.....	.....	6,590	11,860
		C.....	.....	46.1	51.4	2.5	.36	.....	.....	.....	.....	7,325	13,180
		D.....	.....	47.3	52.7	.....	.....	.....	.....	.....	.....	7,510	13,520
14909	4.6	A.....	13.5	38.5	44.1	3.89	.59	5.80	63.11	1.23	25.38	6,125	11,020
		B.....	9.3	40.4	46.2	4.08	.62	5.54	66.15	1.29	22.32	6,420	11,550
		C.....	.....	44.5	51.0	4.50	.68	4.97	72.97	1.42	15.46	7,080	12,750
		D.....	.....	46.6	53.4	.....	.71	5.20	76.41	1.49	16.19	7,415	13,350

IDAHO.

FREMONT COUNTY.

15115	8.3	A.....	11.5	37.2	47.0	4.30	.54	5.94	68.09	1.40	19.73	6,720	12,090
		B.....	3.4	40.6	51.3	4.69	.59	5.47	74.25	1.53	13.47	7,325	13,190
		C.....	.....	42.0	53.1	4.86	.61	5.27	76.89	1.58	10.79	7,590	13,660
		D.....	.....	44.2	55.8	.....	.64	5.54	80.82	1.66	11.34	7,975	14,360
15116	4.3	A.....	7.7	39.7	50.4	2.2	.38	.....	.....	.....	.....	7,155	12,880
		B.....	3.6	41.5	52.6	2.3	.40	.....	.....	.....	.....	7,475	13,460
		C.....	.....	43.0	54.6	2.4	.41	.....	.....	.....	.....	7,755	13,960
		D.....	.....	44.1	55.9	.....	.42	.....	.....	.....	.....	7,945	14,300

^b Volatile matter determined by the "modified method."

ILLINOIS.

McDONOUGH COUNTY.

Name of mine and location.	Collector.	Coal bed and kind of coal.	Location.				Thickness.	
			Quarter.	S.	T.	E.	Coal bed.	Part sampled.
Mine of Willis Stoneking, 12 miles southwest of Macomb.	Henry Hinds.....	No. 2, bituminous.	SE...	33	4 N..	3 W..	<i>Ft. in.</i> 2 2 $\frac{3}{8}$	<i>Ft. in.</i> 2 2
Do.....	do.....	do.....	SE...	33	4 N..	3 W..	2 0	2
Do.....	do.....	do.....	SE...	33	4 N..	3 W..	2 0	(a)
Mine of Frank Burdick, 1 mile northwest of Industry.	do.....	No. 2 (Murfysboro), bituminous.	NE...	16	4 N..	2 W..	2 8 $\frac{1}{2}$	2
Do.....	do.....	do.....	NE...	16	4 N..	2 W..	2 8	2 8

KENTUCKY.

LETCHER COUNTY.

Jenkins No. 4 mine of Consolidation Coal Co., Jenkins.	Chas. Butts.....	Upper Elkhorn, bituminous.					7 6 $\frac{1}{2}$	7 3 $\frac{1}{2}$
Do.....	do.....	do.....					8 5	8
Mine of Joel Ratliff, 5 miles northeast of Jenkins.	do.....	Lower Elkhorn, bituminous.					3 $\frac{1}{2}$	2 $\frac{1}{2}$
Do.....	do.....	do.....					3 $\frac{1}{2}$	1

MISSOURI.

ADAIR COUNTY.

Mine of Star Coal Co., Kirksville.	M. Albertson.....	Tobo, bituminous.	NE...	8	63 N.	15 W.	1 7 $\frac{1}{2}$	1 5 $\frac{1}{2}$
Do.....	do.....	do.....	NE...	8	63 N.	15 W.	1 8	1 8

^a Composite of Nos. 14972 and 14973.

ILLINOIS.

McDONOUGH COUNTY.

Laboratory No.	Air-drying loss.	Form of analysis.	Proximate.				Ultimate.					Heating value.	
			Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Calories.	British thermal units.
14972	11.3	A....	14.6	37.3	42.2	5.9	3.37						
		B....	3.7	42.0	47.6	6.7	3.80						
		C....		43.6	49.4	7.0	3.95						
		D....		46.9	53.1		4.25						
14973	10.3	A....	14.3	38.2	41.9	5.6	2.92						
		B....	4.4	42.6	46.7	6.3	3.25						
		C....		44.6	48.8	6.6	3.41						
		D....		47.7	52.3		3.65						
14974	10.8	A....	14.5	37.5	42.2	5.76	3.16	5.97	63.07	1.17	20.87	6,445	11,600
		B....	4.1	42.1	47.3	6.46	3.54	5.35	70.71	1.31	12.63	7,225	13,010
		C....		43.9	49.4	6.74	3.70	5.10	73.77	1.37	9.32	7,540	13,570
		D....		47.0	53.0		3.97	5.47	79.10	1.47	9.99	8,085	14,550
15117	9.5	A....	12.9	38.6	43.0	5.5	2.41					6,620	11,920
		B....	3.7	42.7	47.5	6.1	2.66					7,315	13,170
		C....		44.3	49.3	6.4	2.77					7,600	13,680
		D....		47.3	52.7		2.96					8,115	14,610
15118	10.6	A....	13.5	37.0	41.9	7.6	3.23					6,360	11,450
		B....	3.3	41.4	46.9	8.4	3.61					7,115	12,810
		C....		42.8	48.5	8.7	3.74					7,360	13,240
		D....		46.9	53.1		4.10					8,065	14,510

KENTUCKY.

LETCHER COUNTY.

14904	1.9	A....	3.9	33.8	54.8	7.5	.51					7,460	13,430
		B....	2.1	34.5	55.8	7.6	.52					7,605	13,690
		C....		35.2	57.0	7.8	.53					7,765	13,970
		D....		38.2	61.8		.57					8,420	15,150
14905	1.7	A....	3.6	35.8	58.0	2.59	.51	5.39	80.06	1.52	9.93	7,910	14,240
		B....	2.0	36.4	59.0	2.63	.52	5.29	81.44	1.55	8.57	8,050	14,490
		C....		37.2	60.1	2.69	.53	5.18	83.09	1.58	6.93	8,210	14,780
		D....		38.2	61.8		.54	5.32	85.38	1.62	7.14	8,440	15,190
14970	3.1	A....	4.8	33.7	57.8	3.7	.82					7,690	13,840
		B....	1.8	34.8	59.6	3.8	.85					7,935	14,290
		C....		35.4	60.7	3.9	.86					8,180	14,550
		D....		36.9	63.1		.90					8,410	15,140
14971	3.6	A....	5.1	28.8	48.2	17.9	.68					6,365	11,450
		B....	1.6	29.9	50.0	18.5	.71					6,600	11,880
		C....		30.3	50.8	18.9	.72					6,710	12,080
		D....		37.4	62.6		.89					8,270	14,880

MISSOURI.

ADAIR COUNTY.

14799	11.0	A....	16.0	38.1	37.2	8.69	4.12	5.90	59.09	.94	21.26	6,000	10,800
		B....	5.6	42.9	41.7	9.76	4.63	5.26	66.39	1.06	12.90	6,740	12,130
		C....		45.4	44.3	10.34	4.90	4.90	70.33	1.12	8.41	7,140	12,850
		D....		50.7	49.3		5.46	5.46	78.44	1.25	9.39	7,960	14,330
14800	9.4	A....	13.9	37.8	38.1	10.15	5.95	5.71	58.76	1.01	18.42	6,030	10,850
		B....	5.0	41.7	42.1	11.20	6.57	5.15	64.86	1.12	11.10	6,655	11,980
		C....		43.9	44.3	11.79	6.91	4.83	68.28	1.17	7.02	7,005	12,610
		D....		49.8	50.2		7.83	5.48	77.41	1.33	7.95	7,940	14,300

MISSOURI—Continued.

PUTNAM COUNTY.

Name of mine and location.	Collector.	Coal bed and kind of coal.	Location.				Thickness.	
			Quarter.	S.	T.	R.	Coal bed.	Part sampled.
Shaft mine of A. P. Anderson, 2½ miles northeast of Unionville.	M. Albertson.....	Mystic, bituminous.	NW..	30	66 N.	19 V.	<i>Ft. in.</i> 2 8½	<i>Ft. in.</i> 2 6
Do.....	.....do.....	.....do.....	NW..	30	66 N.	19 V.	2 10	1 6

MONTANA.

BLAINE COUNTY.

Mine of S. E. Cook, 4 miles northeast of Cleveland.	C. F. Bowen.....	Cook, subbituminous.	SW..	35	30 N.	20 E	3 8½	3 1
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CHOUTEAU COUNTY.

Mine of Mackton Coal Co., 6½ miles northeast of Big Sandy.	C. F. Bowen.....	Mackton, subbituminous.	SW..	18	28 N.	14 E.	7 5	5 6
Do.....	.....do.....	.....do.....	SW..	18	28 N.	14 E.	7 6	6 1

FERGUS COUNTY.

Stone mine, 8 miles north of Helger.	C. F. Bowen.....	Stone, subbituminous.	SE...	8	19 N.	19 E.	6 0	4 4
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MUSSELSHELL COUNTY.

Sholy mine, 1 mile northwest of Painted Rock.	E. G. Woodruff...	Subbituminous.	NW.	14	5 N..	22 E.	2 11	2 11
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ROSEBUD COUNTY.

Prospect, 6 miles east of Bighorn.	C. F. Leshar.....	Subbituminous.	NE..	2	4 N..	35 E.	2 10½	2 8½
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^a Volatile matter determined by the "modified method."

MISSOURI—Continued.

PUTNAM COUNTY.

Laboratory No.	Air-drying loss.	Form of analysis.	Proximate.				Ultimate.					Heating value.	
			Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Calories.	British thermal units.
14880	12.8	A.....	16.5	34.4	37.3	11.8	3.39	.....	.....	.....	.....	5,600	10,080
		B.....	4.3	39.4	42.8	13.5	3.89	.....	.....	.....	.....	6,420	11,560
		C.....	.....	41.2	44.7	14.1	4.06	.....	.....	.....	.....	6,705	12,080
		D.....	.....	48.0	52.0	.....	4.73	.....	.....	.....	.....	7,810	14,050
14881	12.8	A.....	16.5	34.8	37.4	11.3	2.88	.....	.....	.....	.....	5,565	10,010
		B.....	4.3	39.8	42.9	13.0	3.30	.....	.....	.....	.....	6,380	11,430
		C.....	.....	41.6	44.8	13.6	3.45	.....	.....	.....	.....	6,665	12,000
		D.....	.....	48.2	51.8	.....	3.99	.....	.....	.....	.....	7,710	13,880

MONTANA.

BLAINE COUNTY.

14782	7.1	A.....	18.8	^a 31.5	40.4	9.3	0.73	.....	.....	.....	.....	5,075	9,140
		B.....	12.6	33.9	43.5	10.0	.79	.....	.....	.....	.....	5,465	9,830
		C.....	.....	38.8	49.7	11.5	.90	.....	.....	.....	.....	6,250	11,250
		D.....	.....	43.8	56.2	.....	1.02	.....	.....	.....	.....	7,060	12,710

CHOUTEAU COUNTY.

14613	^b 1.8	A.....	13.0	^a 36.3	40.1	10.6	0.53	.....	.....	.....	.....	5,340	9,620
		B.....	11.4	37.0	40.8	10.8	.54	.....	.....	.....	.....	5,440	9,790
		C.....	.....	41.7	46.1	12.2	.61	.....	.....	.....	.....	6,140	11,060
		D.....	.....	47.5	52.5	.....	.69	.....	.....	.....	.....	6,995	12,590
14615	^b 1.9	A.....	12.4	^a 36.9	35.8	14.9	.70	.....	.....	.....	.....	5,050	9,090
		B.....	10.7	37.6	36.5	15.2	.71	.....	.....	.....	.....	5,150	9,270
		C.....	.....	42.2	40.8	17.0	.80	.....	.....	.....	.....	5,765	10,380
		D.....	.....	50.8	49.2	.....	.96	.....	.....	.....	.....	6,950	12,510

FERGUS COUNTY.

14495	11.1	A.....	23.1	^a 33.5	30.6	12.8	1.08	.....	.....	.....	.....	4,305	7,750
		B.....	13.5	37.7	34.4	14.4	1.22	.....	.....	.....	.....	4,845	8,720
		C.....	.....	43.5	39.8	16.7	1.40	.....	.....	.....	.....	5,600	10,080
		D.....	.....	52.2	47.8	.....	1.68	.....	.....	.....	.....	6,720	12,090

MUSSELHELL COUNTY.

15114	4.5	A.....	11.6	31.8	40.4	16.2	1.00	.....	.....	.....	.....	5,565	10,010
		B.....	7.4	33.3	42.3	17.0	1.05	.....	.....	.....	.....	5,825	10,490
		C.....	.....	36.0	45.6	18.4	1.13	.....	.....	.....	.....	6,290	11,330
		D.....	.....	44.1	55.9	.....	1.38	.....	.....	.....	.....	7,710	13,870

ROSEBUD COUNTY.

14755	8.5	A.....	19.8	^a 30.7	35.2	14.3	1.50	.....	.....	.....	.....	4,765	8,580
		B.....	12.3	33.5	38.5	15.7	1.64	.....	.....	.....	.....	5,210	9,380
		C.....	.....	38.2	43.9	17.9	1.87	.....	.....	.....	.....	5,940	10,700
		D.....	.....	46.6	53.4	.....	2.28	.....	.....	.....	.....	7,235	13,030

^b This small air-drying loss indicates that the sample was somewhat weathered.

MONTANA—Continued.

TETON COUNTY.

Name of mine and location.	Collector.	Coal bed and kind of coal.	Location.				Thickness.	
			Quarter.	S.	T.	R.	Coal bed.	Part sampled.
Prospect, 4 miles southwest of Cutbank.	E. Stebinger.....	Subbituminous.	SW..	26	33 N.	6 W..	<i>Ft. in.</i> 1 2	<i>Ft. in.</i> 1 2

VALLEY COUNTY.

Mine of George Pierce, 2½ miles northeast of Plentywood.	C. M. Bauer.....	Pierce, lignite	SE...	10	35 N.	55 E.	8 0	3 9
Richardson mine of M. J. Morris, 2½ miles west of Antelope.	.....do.....	Richardson, lignite.	NE..	21	34 N.	55 E.	8 8	5 2

NEW MEXICO.

COLFAX COUNTY.

Sugarite No. 1 mine of St. Louis, Rocky Mountain & Pacific Co., 7 miles northeast of Raton.	Willis T. Lee.....	Sugarite, bituminous.	NE..	9	31 N.	24 E.	5 6½	5 1
Sugarite No. 2 mine of St. Louis, Rocky Mountain & Pacific Co., 7 miles northeast of Raton.	.....do.....	.....do.....	SW..	3	31 N.	24 E.	5 7	4 9
Gardner No. 1 mine of St. Louis, Rocky Mountain & Pacific Co., Blossburg, 2 miles west of Raton.	.....do.....	Raton, bituminous.	.....	.....	31 N.	23 E.	5 11	5 5
Koehler No. 1 mine of St. Louis, Rocky Mountain & Pacific Co., Koehler.	.....do.....	.....do.....	.....	.....	29 N.	22 E.	8 3	6 3

LINCOLN COUNTY.

Mine of Old Abe Co., 2½ miles southeast of White Oaks.	C. H. Wegemann..	Old Abe, bituminous.	.....	5	7 S...	13 E.	4 ½	4 ½
Mine of Wild Cat Co., 2 miles southeast of White Oaks.	.....do.....	Bituminous.....	.....	32	6 S...	13 E.	2 1	2 1

McKINLEY COUNTY.

School mine of United States Indian Service, 10 miles northeast of Blackrock.	D. E. Winchester.	Subbituminous.	NW..	6	11N..	17W.	3 2	2 10
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^a Volatile matter determined by the "modified method."

MONTANA—Continued.

TETON COUNTY.

Laboratory No.	Air-drying loss.	Form of analysis.	Proximate.				Ultimate.					Heating value.		
			Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Calories.	British thermal units.	
14109	6.2	A.....	16.6	a 29.2	36.2	18.0	0.59							
		B.....	11.1	31.1	38.6	19.2	.63							
		C.....		35.0	43.5	21.5	.71							
		D.....		44.6	55.4		.90							

VALLEY COUNTY.

14670	b 5.9	A.....	34.3	a 29.6	28.0	8.1	0.66						3,755	6,760
		B.....	30.2	31.4	29.8	8.6	.70						3,990	7,180
		C.....		45.0	42.7	12.3	1.00						5,715	10,290
		D.....		51.3	48.7		1.14						6,520	11,730
14614	b 5.4	A.....	29.1	a 29.7	33.8	7.4	.31						4,165	7,500
		B.....	25.1	31.3	35.8	7.8	.33						4,405	7,930
		C.....		41.9	47.7	10.4	.44						5,880	10,580
		D.....		46.7	53.3		.49						6,565	11,820

NEW MEXICO.

COLFAX COUNTY.

14791	2.1	A.....	3.9	38.1	49.1	8.93	0.56	5.71	72.37	1.58	10.85	7,265	13,070
		B.....	1.8	38.9	50.2	9.12	.57	5.60	73.92	1.61	9.18	7,420	13,350
		C.....		39.6	51.1	9.29	.58	5.49	75.25	1.64	7.75	7,550	13,590
		D.....		43.7	56.3		.64	6.05	82.96	1.81	8.54	8,325	14,990
14792	1.0	A.....	2.9	39.7	48.7	8.70	.51	5.62	73.52	1.57	10.08	7,380	13,280
		B.....	1.9	40.1	49.2	8.79	.52	5.57	74.26	1.59	9.27	7,455	13,420
		C.....		40.9	50.1	8.96	.53	5.46	75.73	1.62	7.70	7,600	13,680
		D.....		44.9	55.1		.58	6.00	83.18	1.78	8.46	8,350	15,030
14795	.9	A.....	2.4	36.7	45.7	15.23	.64	5.13	67.91	1.30	9.79	6,810	12,260
		B.....	1.4	37.0	46.2	15.37	.65	5.08	68.53	1.31	9.06	6,870	12,368
		C.....		37.6	46.8	15.60	.66	4.99	69.54	1.33	7.88	6,970	12,550
		D.....		44.5	55.5		.78	5.91	82.39	1.58	9.34	8,260	14,870
14796	1.0	A.....	2.3	35.9	49.9	11.85	.63	5.17	71.27	1.34	9.74	7,180	12,920
		B.....	1.3	36.2	50.5	11.97	.64	5.11	71.99	1.35	8.94	7,250	13,050
		C.....		36.7	51.2	12.13	.65	5.03	72.98	1.37	7.84	7,350	13,230
		D.....		41.8	58.2		.74	5.72	83.05	1.56	8.93	8,365	15,060

LINCOLN COUNTY.

15053	0.9	A.....	2.5	37.9	44.9	14.70	0.83	5.15	68.06	1.23	10.03	6,815	12,260
		B.....	1.6	38.2	45.4	14.83	.84	5.10	68.68	1.24	9.31	6,875	12,380
		C.....		38.8	46.1	15.07	.85	4.99	69.80	1.26	8.03	6,985	12,580
		D.....		45.7	54.3		1.00	5.88	82.18	1.48	9.46	8,225	14,810
15054	1.3	A.....	2.5	34.6	46.0	16.86	.76	4.97	66.65	1.32	9.44	6,640	11,960
		B.....	1.2	35.1	46.6	17.08	.77	4.89	67.53	1.34	8.39	6,730	12,110
		C.....		35.5	47.2	17.30	.78	4.81	68.38	1.35	7.38	6,815	12,270
		D.....		43.0	57.0		.94	5.82	82.69	1.63	8.92	8,240	14,830

McKINLEY COUNTY.

15032	11.0	A.....	14.7	34.9	41.6	8.82	0.79	5.82	60.93	1.12	22.52	5,975	10,760
		B.....	4.1	39.3	46.7	9.91	.89	5.17	68.46	1.26	14.31	6,745	12,150
		C.....		41.0	48.7	10.34	.93	4.91	71.42	1.31	11.09	7,040	12,670
		D.....		45.7	54.3		1.04	5.48	79.65	1.46	12.37	7,850	14,130

^b This small air-drying loss indicates that the sample was somewhat weathered.

NORTH DAKOTA.

ADAMS COUNTY.

Name of mine and location.	Collector.	Coal bed and kind of coal.	Location.				Thickness.	
			Quarter.	S.	T.	R.	Coal bed.	Part sampled.
Nipper and Monroe mine, $\frac{3}{4}$ miles northeast of Haynes.	E. R. Lloyd.....	Haynes, lignite.	NW..	16	129N.	94W.	<i>Ft. in.</i> 8 3	<i>Ft. in.</i> 8 3
Mine of William Pinkham, 9 miles northeast of Haynes.	.....do.....	.....do.....	NW..	36	130N.	94W.	10 10	8 10

BOWMAN COUNTY.

Scranton mine of Chas. Liddell, Scranton.	C. J. Hares.....	Harmon, lignite.	SW..	24	13N..	100W	20 3 $\frac{1}{2}$	6
Durkin mine (local), 2 miles southeast of Amor.	.....do.....	T Cross, lignite.	SW..	34	130N.	103W	8 7 $\frac{1}{2}$	2 7 $\frac{1}{2}$

MORTON COUNTY.

Jones mine. Mr. Kile, operator, $1\frac{1}{4}$ miles west of Leith.	E. B. Lloyd.....	Lignite.....	SE...	12	133N.	88W	8 6	5 6
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OHIO.

JEFFERSON COUNTY.

Amsterdam mine of Youghiogheny & Ohio Coal Co., Amsterdam.	D. Dale Condit....	Lower Freeport, bituminous.	SW..	18	11N..	4W..	5 7 $\frac{1}{2}$	3 9
Do.....	.....do.....	.....do.....	SW..	18	11N..	4W...	5 2 $\frac{1}{2}$	3 4
Do.....	.....do.....	.....do.....	SW..	18	11N..	4W...	5 3 $\frac{1}{2}$	3 5 $\frac{1}{2}$
Eastern Ohio mine of Rice Coal Co., 2 miles northeast of Amsterdam.	.....do.....	.....do.....	NE..	8	12N..	4W...	5 4	4 8
Do.....	.....do.....	.....do.....	NE..	8	12N..	4W..	5 4	4 9
Do.....	.....do.....	.....do.....	NE..	8	12N..	4W...	5 4 $\frac{1}{2}$	4 11

^a This small air-drying loss indicates that the sample was somewhat weathered.

NORTH DAKOTA.

ADAMS COUNTY.

Laboratory No.	Air-drying loss.	Form of analysis.	Proximate.				Ultimate.					Heating value.	
			Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Calories.	British thermal units.
14542	a14.5	A.....	32.6	b30.6	28.5	8.3	1.33					4,085	7,360
		B.....	21.2	35.8	33.3	9.7	1.79					4,780	8,600
		C.....		45.4	42.3	12.3	2.27					6,070	10,920
		D.....		51.8	48.2		2.59					6,920	12,460
14544	a15.3	A.....	32.4	b30.9	28.1	8.6	1.49					4,070	7,330
		B.....	20.2	36.5	33.2	10.1	1.76					4,805	8,650
		C.....		45.7	41.6	12.7	2.21					6,025	10,850
		D.....		52.4	47.6		2.53					6,900	12,420

BOWMAN COUNTY.

14485	22.5	A.....	34.8	b31.1	26.0	8.1	0.66					3,840	6,920
		B.....	15.9	40.1	33.5	10.5	.85					4,960	8,920
		C.....		47.7	39.8	12.5	1.01					5,890	10,610
		D.....		54.5	45.5		1.15					6,730	12,120
14857	35.8	A.....	43.6	b23.2	27.0	6.2	.65					3,240	5,830
		B.....	12.2	36.2	42.0	9.6	1.01					5,045	9,080
		C.....		41.2	47.8	11.0	1.15					5,745	10,340
		D.....		46.3	53.7		1.29					6,450	11,610

MORTON COUNTY.

14729	27.1	A.....	36.2	b29.8	25.3	8.70	0.68	6.76	39.45	0.59	43.82	3,730	6,700
		B.....	12.5	40.8	34.8	11.93	.93	5.15	54.11	.81	27.07	5,105	9,190
		C.....		46.7	39.7	13.63	1.07	4.29	61.81	.92	18.28	5,830	10,500
		D.....		54.0	46.0		1.24	4.97	71.56	1.07	21.16	6,750	12,150

OHIO.

JEFFERSON COUNTY.

15388	1.6	A.....	3.7	37.4	51.2	7.7	3.07					7,340	13,220
		B.....	2.1	38.0	52.1	7.8	3.12					7,460	13,430
		C.....		38.8	53.2	8.0	3.19					7,620	13,820
		D.....		42.2	57.8		3.47					8,280	14,910
15389	1.4	A.....	3.5	38.3	50.8	7.4	2.99					7,365	13,250
		B.....	2.1	38.9	51.5	7.5	3.03					7,470	13,440
		C.....		39.7	52.6	7.7	3.10					7,630	13,740
		D.....		43.0	57.0		3.36					8,265	14,880
15390	1.2	A.....	3.2	38.9	50.4	7.5	3.23					7,360	13,250
		B.....	2.1	39.3	51.0	7.6	3.27					7,450	13,410
		C.....		40.2	52.1	7.7	3.34					7,610	13,690
		D.....		43.6	56.4		3.62					8,245	14,840
15391	1.5	A.....	3.6	37.5	49.2	9.7	3.08					7,155	12,880
		B.....	2.1	38.2	49.9	9.8	3.13					7,265	13,080
		C.....		39.0	51.0	10.0	3.19					7,420	13,360
		D.....		43.3	56.7		3.55					8,250	14,850
15392	1.5	A.....	3.5	38.6	49.7	8.2	2.40					7,345	13,220
		B.....	2.0	39.2	50.4	8.4	2.44					7,460	13,420
		C.....		40.0	51.4	8.6	2.49					7,610	13,700
		D.....		43.7	56.3		2.72					8,320	14,980
15393	2.0	A.....	4.1	38.6	48.9	8.4	2.95					7,235	13,020
		B.....	2.1	39.4	49.9	8.6	3.01					7,380	13,290
		C.....		40.2	51.0	8.8	3.07					7,540	13,570
		D.....		44.1	55.9		3.37					8,265	14,870

^b Volatile matter determined by the "modified method."

OHIO—Continued.

JEFFERSON COUNTY—Continued.

Name of mine and location.	Collector.	Coal bed and kind of coal.	Location.				Thickness.	
			Quarter.	S.	T.	R.	Coal bed.	Part sampled.
Elizabeth mine of Wolf Run Coal Co., 1½ miles east of Amsterdam.	D. Dale Condit	Lower Freeport, bituminous.	SE...	7	12N..	4W...	<i>Ft. in.</i> 4 5½	<i>Ft. in.</i> 3 9
Do.....	do.....	do.....	SE...	7	12N..	4W...	5 5½	4 1
Do.....	do.....	Upper Freeport, bituminous.	SE...	7	12N..	4W...	4 7½	3 10½
Parlett mine of Etta Coal Co., 2 miles southeast of Hopedale.	do.....	Pittsburgh, bituminous.	SE...	32	9N...	3W...	2 9½	2 6
Do.....	do.....	do.....	SE...	32	9N..	3W..	7 11	4 5
Plum Run No. 1 mine of United States Coal Co., 2 miles east of Smithfield.	do.....	do.....	SW...	29	5N..	2W..	4 9	4 6
Plum Run No. 4 mine of United States Coal Co., 2 miles east of Smithfield.	do.....	do.....	NW...	29	5N..	2W..	4 4½	4 1
Plum Run No. 5 mine of United States Coal Co., 2 miles east of Smithfield.	do.....	do.....	SW...	29	5N..	2W..	4 6½	4 3½
Piney Fork No. 1 mine of Jefferson Coal Co., 2 miles southwest of Smithfield.	do.....	do.....	SW...	22	8N..	3W..	4 9½	4 1½
Piney Fork No. 2 mine of Jefferson Coal Co., 2 miles southwest of Smithfield.	do.....	do.....	NE...	22	8N..	3W..	4 5½	3 10½
Do.....	do.....	do.....	NE...	22	8N..	3W..	5 8	4 1½
Goucher No. 2 mine of Dexter Coal Co., 1½ miles northwest of Brilliant.	do.....	do.....	SE...	6	5N..	2W..	4 9½	4 5½
Do.....	do.....	do.....	SE...	6	5N..	2W..	5 3	4 8½
La Belle mine of La Belle Iron & Steel Co., Steubenville.	do.....	Lower Freeport, bituminous.	SW...	29	2N..	1W..	3 2	3 ½
Do.....	do.....	do.....	SW...	29	2N..	1W..	3 4½	3 1½

OHIO—Continued.

JEFFERSON COUNTY—Continued.

Laboratory No.	Air-drying loss.	Form of analysis.	Proximate.				Ultimate.					Heating value.	
			Mois-ture.	Vola-tile mat-ter.	Fixed car-bon.	Ash.	Sul-phur.	Hy-dro-gen.	Car-bon.	Nitro-gen.	Oxy-gen.	Calo-ries.	British thermal units.
15440	1.7	A....	3.4	38.0	52.4	6.2	2.20	.....	.....	.....	.....	7,520	13,530
		B....	1.7	38.7	53.3	6.3	2.24	.....	.....	.....	.....	7,650	13,770
		C....	.....	39.4	54.2	6.4	2.28	.....	.....	.....	.....	7,785	14,010
		D....	.....	42.1	57.9	.....	2.44	.....	.....	.....	.....	8,320	14,970
15441	1.4	A....	3.5	37.9	50.6	8.0	3.14	.....	.....	.....	.....	7,365	13,260
		B....	2.1	38.5	51.3	8.1	3.18	.....	.....	.....	.....	7,470	13,440
		C....	.....	39.3	52.5	8.2	3.25	.....	.....	.....	.....	7,630	13,740
		D....	.....	42.8	57.2	.....	3.54	.....	.....	.....	.....	8,315	14,970
15443	1.8	A....	3.6	37.0	50.7	8.74	3.70	5.19	71.30	1.39	9.68	7,225	13,000
		B....	1.8	37.7	51.6	8.90	3.77	5.08	72.61	1.42	8.22	7,355	13,240
		C....	.....	38.4	52.5	9.07	3.84	4.97	73.95	1.44	6.73	7,495	13,490
		D....	.....	42.2	57.8	.....	4.22	5.47	81.32	1.58	7.41	8,240	14,830
15444	2.2	A....	5.0	36.2	52.8	6.0	1.74	.....	.....	.....	.....	7,325	13,190
		B....	2.9	37.0	54.0	6.1	1.78	.....	.....	.....	.....	7,490	13,490
		C....	.....	38.1	55.6	6.3	1.83	.....	.....	.....	.....	7,715	13,880
		D....	.....	40.6	59.4	.....	1.95	.....	.....	.....	.....	8,235	14,820
15445	2.0	A....	4.3	37.1	49.1	9.5	3.82	.....	.....	.....	.....	7,070	12,730
		B....	1.8	38.1	50.4	9.7	3.92	.....	.....	.....	.....	7,260	13,070
		C....	.....	38.7	51.4	9.9	3.99	.....	.....	.....	.....	7,390	13,300
		D....	.....	43.0	57.0	.....	4.43	.....	.....	.....	.....	8,200	14,760
15486	2.6	A....	4.8	35.9	54.0	5.31	.98	5.35	74.13	1.46	12.77	7,415	13,350
		B....	2.2	36.9	55.4	5.45	1.01	5.20	76.11	1.50	10.73	7,615	13,710
		C....	.....	37.7	56.7	5.58	1.03	5.06	77.85	1.53	8.95	7,790	14,020
		D....	.....	40.0	60.0	.....	1.09	5.36	82.45	1.62	9.48	8,250	14,850
15487	2.6	A....	4.5	36.4	51.1	8.0	3.33	.....	.....	.....	.....	7,155	12,880
		B....	2.0	37.4	52.4	8.2	3.42	.....	.....	.....	.....	7,350	13,230
		C....	.....	38.1	53.5	8.4	3.49	.....	.....	.....	.....	7,495	13,490
		D....	.....	41.6	58.4	.....	3.81	.....	.....	.....	.....	8,180	14,720
15488	2.3	A....	4.3	36.6	52.2	6.9	2.57	.....	.....	.....	.....	7,305	13,150
		B....	2.0	37.5	53.4	7.1	2.63	.....	.....	.....	.....	7,480	13,460
		C....	.....	38.2	54.5	7.3	2.68	.....	.....	.....	.....	7,630	13,740
		D....	.....	41.2	58.8	.....	2.89	.....	.....	.....	.....	8,230	13,810
15489	2.8	A....	4.9	36.6	51.2	7.25	2.60	5.36	71.91	1.38	11.50	7,220	12,990
		B....	2.1	37.7	52.7	7.46	2.67	5.20	73.98	1.42	9.27	7,425	13,370
		C....	.....	38.5	53.9	7.62	2.73	5.07	75.59	1.45	7.54	7,590	13,660
		D....	.....	41.7	58.3	.....	2.96	5.49	81.83	1.57	8.15	8,215	14,790
15490	3.2	A....	5.5	35.7	53.3	5.5	.77	.....	.....	.....	.....	7,325	13,180
		B....	2.4	36.9	55.0	5.7	.80	.....	.....	.....	.....	7,565	13,620
		C....	.....	37.8	56.4	5.8	.81	.....	.....	.....	.....	7,750	13,950
		D....	.....	40.2	59.8	.....	.86	.....	.....	.....	.....	8,225	14,810
15491	3.2	A....	5.5	35.7	54.2	4.6	.84	.....	.....	.....	.....	7,400	13,320
		B....	2.3	36.9	56.0	4.8	.87	.....	.....	.....	.....	7,645	13,760
		C....	.....	37.8	57.3	4.9	.89	.....	.....	.....	.....	7,825	14,090
		D....	.....	39.7	60.3	.....	.94	.....	.....	.....	.....	8,225	14,810
15563	2.0	A....	3.8	38.8	50.0	7.4	3.84	.....	.....	.....	.....	7,265	13,080
		B....	1.8	39.6	51.1	7.5	3.92	.....	.....	.....	.....	7,415	13,350
		C....	.....	40.3	52.0	7.7	3.99	.....	.....	.....	.....	7,555	13,600
		D....	.....	43.7	56.3	.....	4.32	.....	.....	.....	.....	8,180	14,730
15564	2.5	A....	4.3	37.4	50.3	8.0	3.72	.....	.....	.....	.....	7,200	12,960
		B....	1.8	38.4	51.6	8.2	3.82	.....	.....	.....	.....	7,385	13,300
		C....	.....	39.1	52.5	8.4	3.89	.....	.....	.....	.....	7,525	13,540
		D....	.....	42.7	57.3	.....	4.25	.....	.....	.....	.....	8,210	14,780
15675	1.6	A....	3.8	35.9	53.4	6.85	1.90	5.24	74.20	1.45	10.36	7,420	13,350
		B....	2.2	36.5	54.3	6.96	1.93	5.14	75.41	1.47	9.09	7,540	13,570
		C....	.....	37.3	55.6	7.12	1.98	5.01	77.15	1.51	7.23	7,710	13,880
		D....	.....	40.2	59.8	.....	2.13	5.39	83.07	1.63	7.78	8,300	14,950
15676	1.5	A....	3.8	35.4	53.4	7.4	1.91	.....	.....	.....	.....	7,345	13,220
		B....	2.4	35.9	54.2	7.5	1.94	.....	.....	.....	.....	7,455	13,420
		C....	.....	36.8	55.5	7.7	1.99	.....	.....	.....	.....	7,635	13,740
		D....	.....	39.9	60.1	.....	2.16	.....	.....	.....	.....	8,270	14,890

OREGON.
COOS COUNTY.

Name of mine and location.	Collector.	Coal bed and kind of coal.	Location.				Thickness.	
			Quar- ter.	S.	T.	R.	Coal bed.	Part sam- pled.
Prospect of O. I. Hillis...	M. R. Campbell...	Anderson, bituminous.	NE..	32	32 S..	11 W.	<i>Ft. in.</i> 6 10	<i>Ft. in.</i> 1 3½
Do.....	do.....	do.....	NE..	32	32 S..	11 W.	6 10	2 9½
Prospect of James H. Flanigan.	do.....	do.....	NE..	28	32 S..	11 W.	5 6	5 1½
Vanderpool prospect.....	do.....	do.....	NE..	30	32 S..	11 W.	6 ½	1 10
Prospect of Arthur Hammond.	do.....	Carter, bituminous.	NE..	29	32 S..	11 W.	6	4 3

PENNSYLVANIA.
WASHINGTON COUNTY.

Penobscot mine of Avella Coal Co., 2 miles northwest of Avella.	D. Dale Condit....	Pittsburgh, bituminous.					4 3½	3 11
Do.....	do.....	do.....					4 2	3 10

SOUTH DAKOTA.
HARDING COUNTY.

Mine of G. F. Newcomb, 5½ miles southeast of Ralph.	C. J. Hares.....	Newcomb, lignite.	SW..	10	20 N.	9 E..	10 1	10 1
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PERKINS COUNTY.

Nelson mine of C. E. Forest, 3 miles southwest of Lodgepole.	E. R. Lloyd.....	Lodgepole, lignite.	NW .	29	21 N.	12 E..	7 0	7
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* Volatile matter determined by the "modified method."

OREGON.
COOS COUNTY.

Laboratory No.	Air-drying loss.	Form of analysis.	Proximate.				Ultimate.					Heating value.	
			Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Calories.	British thermal units.
14827	6.7	A....	10.0	38.5	36.3	15.2	0.63	.....	.....	.....	.....	5,850	10,530
		B....	3.5	41.2	39.0	16.3	.68	.....	.....	.....	.....	6,270	11,280
		C....	.....	42.7	40.4	16.9	.70	.....	.....	.....	.....	6,495	11,690
		D....	.....	51.4	48.6	.....	.84	.....	.....	.....	.....	7,820	14,070
14830	3.3	A....	6.7	35.5	27.4	30.4	2.22	.....	.....	.....	.....	4,750	8,550
		B....	3.5	36.7	28.4	31.4	2.30	.....	.....	.....	.....	4,910	8,840
		C....	.....	38.1	29.4	32.5	2.38	.....	.....	.....	.....	5,090	9,170
		D....	.....	56.4	43.6	.....	3.53	.....	.....	.....	.....	7,550	13,590
14828	6.2	A....	10.1	31.3	24.9	33.7	1.11	.....	.....	.....	.....	4,150	7,470
		B....	4.2	33.4	26.5	35.9	1.18	.....	.....	.....	.....	4,420	7,960
		C....	.....	34.8	27.7	37.5	1.24	.....	.....	.....	.....	4,615	8,310
		D....	.....	55.7	44.3	.....	1.98	.....	.....	.....	.....	7,375	13,280
14829	3.3	A....	7.3	37.6	27.6	27.5	2.59	.....	.....	.....	.....	4,915	8,850
		B....	4.1	38.9	28.5	28.5	2.68	.....	.....	.....	.....	5,085	9,150
		C....	.....	40.6	29.7	29.7	2.79	.....	.....	.....	.....	5,305	9,550
		D....	.....	57.7	42.3	.....	3.97	.....	.....	.....	.....	7,540	13,580
14831	3.7	A....	8.0	35.0	37.1	19.9	.58	.....	.....	.....	.....	5,460	9,830
		B....	4.5	36.3	38.6	20.6	.60	.....	.....	.....	.....	5,670	10,210
		C....	.....	38.0	40.4	21.6	.63	.....	.....	.....	.....	5,940	10,690
		D....	.....	48.5	51.5	.....	.80	.....	.....	.....	.....	7,575	13,630

PENNSYLVANIA.

WASHINGTON COUNTY.

15673	2.1	A....	4.3	37.0	52.9	5.84	1.90	5.31	74.14	1.53	11.28	7,390	13,300
		B....	2.2	37.8	54.0	5.97	1.94	5.19	75.73	1.56	9.61	7,550	13,590
		C....	.....	38.7	55.2	6.10	1.99	5.05	77.48	1.60	7.78	7,725	13,900
		D....	.....	41.2	58.8	.....	2.12	5.38	82.52	1.70	8.28	8,225	14,810
15674	1.7	A....	4.3	37.8	51.6	6.3	2.15	.....	.....	.....	.....	7,400	13,320
		B....	2.6	38.5	52.5	6.4	2.19	.....	.....	.....	.....	7,525	13,550
		C....	.....	39.5	53.9	6.6	2.25	.....	.....	.....	.....	7,730	13,910
		D....	.....	42.3	57.7	.....	2.41	.....	.....	.....	.....	8,275	14,900

SOUTH DAKOTA.

HARDING COUNTY.

15062	26.6	A....	34.7	a 27.2	29.0	9.1	0.95	.....	.....	.....	.....	3,475	6,250
		B....	11.1	37.1	39.4	12.4	1.29	.....	.....	.....	.....	4,735	8,520
		C....	.....	41.7	44.4	13.9	1.46	.....	.....	.....	.....	5,325	9,580
		D....	.....	48.4	51.6	.....	1.70	.....	.....	.....	.....	6,185	11,140

PERKINS COUNTY.

14354	21.2	A....	33.3	28.9	27.3	10.5	.76	.....	.....	.....	.....	3,865	6,960
		B....	15.4	36.7	34.6	13.3	.97	.....	.....	.....	.....	4,905	8,830
		C....	.....	43.4	40.9	15.7	1.14	.....	.....	.....	.....	5,795	10,430
		D....	.....	51.5	48.5	.....	1.35	.....	.....	.....	.....	6,875	12,380

UTAH.

CARBON COUNTY.

Name of mine and location.	Collector.	Coal bed and kind of coal.	Location.				Thickness.	
			Quarter.	S.	T.	R.	Coal bed.	Part sampled.
Jesse Knight mine, operated by S. S. Young, 9 miles northeast of Price.	Frank R. Clark....	Bituminous...	SE...	7	13 S..	11 E..	<i>Ft. in.</i> 6 8	<i>Ft. in.</i> 6 5
Mine of Branch Bros., 14 miles northeast of Wellington.	.....do.....	.....do.....	.....	23	13 S..	12 E..	8 6	8 2½

EMERY COUNTY.

Outcrop, 11 miles southwest of Emery.	C. T. Lupton.....	No. 4, bituminous.	SW..	32	23 S..	6 E..	12 3	10 5
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SEVIER COUNTY.

Kearns & Duggins mine, operated by Ole L. Black, 15 miles southeast of Salina.	C. T. Lupton.....	Duggins, bituminous.	SW..	7	22 S..	3 E..	3 9	3 7
Outcrop, 16 miles southwest of Emery.	.....do.....	No. 1, bituminous.	NE..	26	24 S..	5 E..	11 3	11
Prospect, 26 miles southwest of Emery.	.....do.....	.....do.....	NW..	3	26 S..	4 E..	5 1	3

VIRGINIA.

DICKINSON COUNTY.

Mine of John A. Yeates, 1 mile southwest of Clintwood.	Chas. Butts.....	Clintwood, bituminous.	.....	.....	.....	.....	4 2¼	4 2¼
Mine of Elbert Powers, 3 miles southeast of Clintwood.	.....do.....	.....do.....	.....	.....	.....	.....	7 10½	4 8

^a Volatile matter determined by the "modified method."

UTAH.

CARBON COUNTY.

Laboratory No.	Air-drying loss.	Form of analysis.	Proximate.				Ultimate.					Heating value.	
			Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Calories.	British thermal units.
14678	0.3	A.....	5.7	41.8	47.7	4.8	.58					7,020	12,640
		B.....	5.4	42.0	47.8	4.8	.58					7,040	12,680
		C.....		44.4	50.5	5.1	.61					7,445	13,400
		D.....		46.8	53.2		.64					7,840	14,110
14801	5.3	A.....	8.5	39.8	47.9	3.8	.48					7,115	12,810
		B.....	3.4	42.0	50.5	4.1	.51					7,515	13,520
		C.....		43.5	52.3	4.2	.52					7,780	14,000
		D.....		45.4	54.6		.54					8,120	14,620

EMERY COUNTY.

14903	8.5	A.....	16.7	34.3	41.0	7.1	1.12					5,275	9,500
		B.....	8.9	37.5	45.8	7.8	1.22					5,765	10,380
		C.....		41.2	50.3	8.5	1.34					6,330	11,400
		D.....		45.0	55.0		1.46					6,920	12,460

SEVIER COUNTY.

15045	3.1	A.....	6.4	45.1	36.3	12.2	.44					6,530	11,750
		B.....	3.4	46.5	37.5	12.6	.45					6,740	12,130
		C.....		48.2	38.7	13.1	.47					6,975	12,550
		D.....		55.4	44.6		.54					8,020	14,440
15061	11.6	A.....	18.4	33.9	42.1	5.6	.41					5,270	9,490
		B.....	7.7	38.3	47.7	6.3	.46					5,960	10,730
		C.....		41.5	51.7	6.8	.50					6,460	11,630
		D.....		44.5	55.5		.54					6,930	12,480
15090	17.0	A.....	23.6	32.6	33.2	10.6	2.88					4,345	7,820
		B.....	7.9	39.3	40.1	12.7	3.47					5,235	9,430
		C.....		47.7	43.5	13.8	3.77					5,685	10,240
		D.....		49.5	50.5		4.38					6,600	11,880

VIRGINIA.

DICKINSON COUNTY.

14766	1.2	A.....	2.2	34.2	60.4	3.2	.85					8,110	14,590
		B.....	1.0	34.6	61.2	3.2	.86					8,205	14,770
		C.....		34.9	61.8	3.3	.87					8,290	14,920
		D.....		36.1	63.9		.90					8,570	15,420
14767	3.3	A.....	4.3	29.4	62.1	4.2	1.02						
		B.....	1.0	30.4	64.2	4.4	1.05						
		C.....		30.7	64.9	4.4	1.07						
		D.....		32.1	67.9		1.12						

VIRGINIA—Continued.

WISE COUNTY.

Name of mine and location.	Collector.	Coal bed and kind of coal.	Location.				Thickness.	
			Quar-ter.	S.	T.	R.	Coal bed.	Part sam-pled.
Pardee No. 1 mine of Blackwood Coal & Coke Co., Pardee.	Chas. Butts.....	Parsons, bituminous.					<i>Ft. in.</i> 9 7	<i>Ft. in.</i> 9 7
Glamorgan No. 3 mine of Stone Gap Colliery Co., Glamorgan.	.....do.....	Glamorgan, bituminous.					4 5½	4 3
Do.....	.....do.....	.....do.....					4 4	4 3
Mine of David Sturgill, 1½ miles south of Flat Gap.	.....do.....	Lower Standiford, bituminous.					3 2	3 2
Mine of J. H. Mullin, 3 miles southwest of Flat Gap.	.....do.....	Lower Bolling, bituminous.					4 7	4 1
Mine of Reuben Bolling, 2 miles east of Flat Gap.	.....do.....	Upper Bolling, bituminous.					4 1½	11

WEST VIRGINIA.

BROOKE COUNTY.

Mine No. 1 of West-Virginia-Pittsburgh Coal Co., 1 mile west of Colliers Station.	D. Dale Condit....	Pittsburgh, bituminous.					4 ¾	3 6½
Do.....	.....do.....	.....do.....					4 8	4 ½

WYOMING.

CONVERSE COUNTY.

Inez mine of A. M. Craft, 1 mile southwest of Inez.	Frank A. Herald..	Subbituminous.	NW.	16	33 N.	73 W.	5 3	5 3
Diamond mine of J. J. Putnam, 1½ miles south of Inez.	V. H. Barnett.....	.....do.....	SE.	16	33 N.	73 W.	4 8	4 8

^a Volatile matter determined by the "modified method."

VIRGINIA—Continued.

WISE COUNTY.

Laboratory No.	Air-drying loss.	Form of analysis.	Proximate.				Ultimate.					Heating value.	
			Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Calories.	British thermal units.
15099	1.0	A....	2.3	33.8	54.7	9.21	1.56	4.99	74.46	1.57	8.21	7,420	13,360
		B....	1.3	34.2	55.2	9.30	1.58	4.93	75.21	1.59	7.39	7,495	13,490
		C....	.....	34.6	56.0	9.43	1.60	4.85	76.20	1.61	6.31	7,595	13,670
		D....	.....	38.2	61.8	.....	1.77	5.35	84.13	1.78	6.97	8,385	15,100
15100	1.6	A....	2.6	33.1	59.3	5.0	1.37	.....	.....	.....	.....	7,895	14,220
		B....	1.1	33.6	60.2	5.1	1.39	.....	.....	.....	.....	8,025	14,450
		C....	.....	34.0	60.9	5.1	1.41	.....	.....	.....	.....	8,115	14,600
		D....	.....	35.8	64.2	.....	1.49	.....	.....	.....	.....	8,550	15,390
15101	2.0	A....	3.2	31.3	59.1	6.37	.87	5.27	78.02	1.65	7.82	7,730	13,910
		B....	1.3	31.9	60.3	6.50	.89	5.15	79.61	1.68	6.17	7,885	14,200
		C....	.....	32.3	61.1	6.58	.90	5.08	80.65	1.71	5.08	7,990	14,380
		D....	.....	34.6	65.4	.....	.96	5.44	86.33	1.83	5.44	8,550	15,390
15172	2.8	A....	4.1	35.2	55.7	5.0	1.74	.....	.....	.....	.....	7,725	13,910
		B....	1.3	36.2	57.3	5.2	1.79	.....	.....	.....	.....	7,950	14,310
		C....	.....	36.7	58.1	5.2	1.81	.....	.....	.....	.....	8,055	14,500
		D....	.....	38.7	61.3	.....	1.91	.....	.....	.....	.....	8,500	15,300
15173	2.6	A....	4.0	31.8	53.0	11.2	.97	.....	.....	.....	.....	7,140	12,850
		B....	1.4	32.6	54.5	11.5	1.00	.....	.....	.....	.....	7,330	13,200
		C....	.....	33.1	55.3	11.6	1.01	.....	.....	.....	.....	7,435	13,380
		D....	.....	37.4	62.6	.....	1.14	.....	.....	.....	.....	8,415	15,150
15174	5.8	A....	6.9	30.4	54.6	8.1	.95	.....	.....	.....	.....	7,210	12,980
		B....	1.2	32.3	57.9	8.6	1.01	.....	.....	.....	.....	7,655	13,780
		C....	.....	32.6	58.6	8.8	1.02	.....	.....	.....	.....	7,745	13,940
		D....	.....	35.8	64.2	.....	1.12	.....	.....	.....	.....	8,485	15,280

WEST VIRGINIA.

BROOKE COUNTY.

15671	2.6	A....	4.6	35.4	54.0	6.01	1.28	5.28	73.81	1.55	12.07	7,350	13,230
		B....	2.0	36.3	55.5	6.17	1.31	5.12	75.78	1.59	10.03	7,550	13,590
		C....	.....	37.1	56.6	6.30	1.34	5.00	77.35	1.62	8.39	7,705	13,870
		D....	.....	39.6	60.4	.....	1.43	5.34	82.55	1.73	8.95	8,225	14,800
15672	1.5	A....	4.1	36.6	53.3	6.0	2.07	.....	.....	.....	.....	7,445	13,400
		B....	2.7	37.2	54.0	6.1	2.10	.....	.....	.....	.....	7,560	13,610
		C....	.....	38.2	55.6	6.2	2.16	.....	.....	.....	.....	7,765	13,980
		D....	.....	40.8	59.2	.....	2.30	.....	.....	.....	.....	8,285	14,910

WYOMING.

CONVERSE COUNTY.

14754	15.7	A....	27.9	32.1	31.7	8.32	0.71	6.35	45.34	-0.73	38.55	4,330	7,790
		B....	14.4	38.1	37.6	9.87	.84	5.47	53.79	.87	29.16	5,135	9,240
		C....	.....	44.5	44.0	11.54	.98	4.51	62.87	1.01	19.09	6,000	10,300
		D....	.....	50.3	49.7	.....	1.11	5.10	71.07	1.14	21.58	6,785	12,210
14781	11.2	A....	25.6	32.7	30.3	11.4	1.25	.....	.....	.....	.....	4,370	7,870
		B....	16.2	36.9	34.1	12.8	1.41	.....	.....	.....	.....	4,920	8,860
		C....	.....	44.0	40.7	15.3	1.68	.....	.....	.....	.....	5,870	10,570
		D....	.....	51.9	48.1	.....	1.98	.....	.....	.....	.....	6,930	12,470

WYOMING—Continued.

CROOK COUNTY.

Name of mine and location.	Collector.	Coal bed and kind of coal.	Location.				Thickness.	
			Quarter.	S.	T.	R.	Coal bed.	Part sampled.
Mine of John J. Belshe, $\frac{7}{8}$ miles west of Sundance.	Max W. Ball.....	Belshe, bituminous...	NW	24	51 N.	64 W.	<i>Ft. in.</i> 5 3 $\frac{1}{2}$	<i>Ft. in.</i> 4 10 $\frac{1}{2}$
Do.....	do.....	do.....	NW	24	51 N.	64 W.	4 3 $\frac{1}{2}$	3 5 $\frac{1}{2}$
Do.....	do.....	do.....	NW	24	51 N.	64 W.	4 3 $\frac{1}{2}$	4 3 $\frac{1}{2}$

HOT SPRINGS COUNTY.

Prospect of David Dickie.	D. F. Hewett.....	Subbituminous.	2	46 N.	99 W.	4	4
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PARK COUNTY.

Mayfield mine.....	D. F. Hewett.....	Mayfield big bed, subbituminous.	26	46 N.	99 W.	30	6
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CANADA.

ALBERTA PROVINCE.

Galt mine of Canadian Pacific Ry. Co., 1 mile north of Lethbridge.	E. Stebinger.....	Lethbridge, subbituminous.	9 N.	22 W.	4 4	4 2
Mine of city of Lethbridge, 1 mile west of Lethbridge.	do.....	do.....	.....	.....	9 N.	22 W.	6 $\frac{1}{2}$	4 3 $\frac{1}{2}$

* Volatile matter determined by the "modified method."

WYOMING—Continued.

CROOK COUNTY.

Laboratory No.	Air-drying loss.	Form of analysis.	Proximate.				Ultimate.					Heating value.	
			Moisture.	Volatile matter.	Fixed carbon.	Ash.	Sulphur.	Hydrogen.	Carbon.	Nitrogen.	Oxygen.	Calories.	British thermal units.
15713	15.7	A.....	20.2	36.4	34.1	9.3	5.25	.....	.....	.....	.....	5,190	9,350
		B.....	5.4	43.1	40.4	11.1	6.23	.....	.....	.....	.....	6,160	11,090
		C.....	.....	45.6	42.7	11.7	6.58	.....	.....	.....	.....	6,510	11,820
		D.....	.....	51.6	48.4	.....	7.45	.....	.....	.....	.....	7,375	13,270
15714	13.7	A.....	19.3	35.4	34.2	11.07	4.38	5.90	51.02	0.75	26.88	5,120	9,200
		B.....	6.5	41.0	39.7	12.83	5.08	5.07	59.12	.87	17.03	5,920	10,660
		C.....	.....	43.8	42.5	13.72	5.43	4.65	63.25	.93	12.02	6,335	11,400
		D.....	.....	50.8	49.2	.....	6.29	5.39	73.31	1.08	13.93	7,340	13,220
15715	12.4	A.....	17.1	34.1	32.6	16.2	5.18	.....	.....	.....	.....	4,890	8,800
		B.....	5.4	38.9	37.2	18.5	5.81	.....	.....	.....	.....	5,585	10,050
		C.....	.....	41.2	39.3	19.5	6.25	.....	.....	.....	.....	5,905	10,630
		D.....	.....	51.1	48.9	.....	7.77	.....	.....	.....	.....	7,340	13,210

HOT SPRINGS COUNTY.

14679	a0.9	A.....	14.7	37.8	38.1	9.4	0.70	.....	.....	.....	.....	5,585	10,060
		B.....	14.0	38.1	38.4	9.5	.71	.....	.....	.....	.....	5,640	10,150
		C.....	.....	44.3	44.7	11.0	.82	.....	.....	.....	.....	6,555	11,800
		D.....	.....	49.8	50.2	.....	.92	.....	.....	.....	.....	7,365	13,260

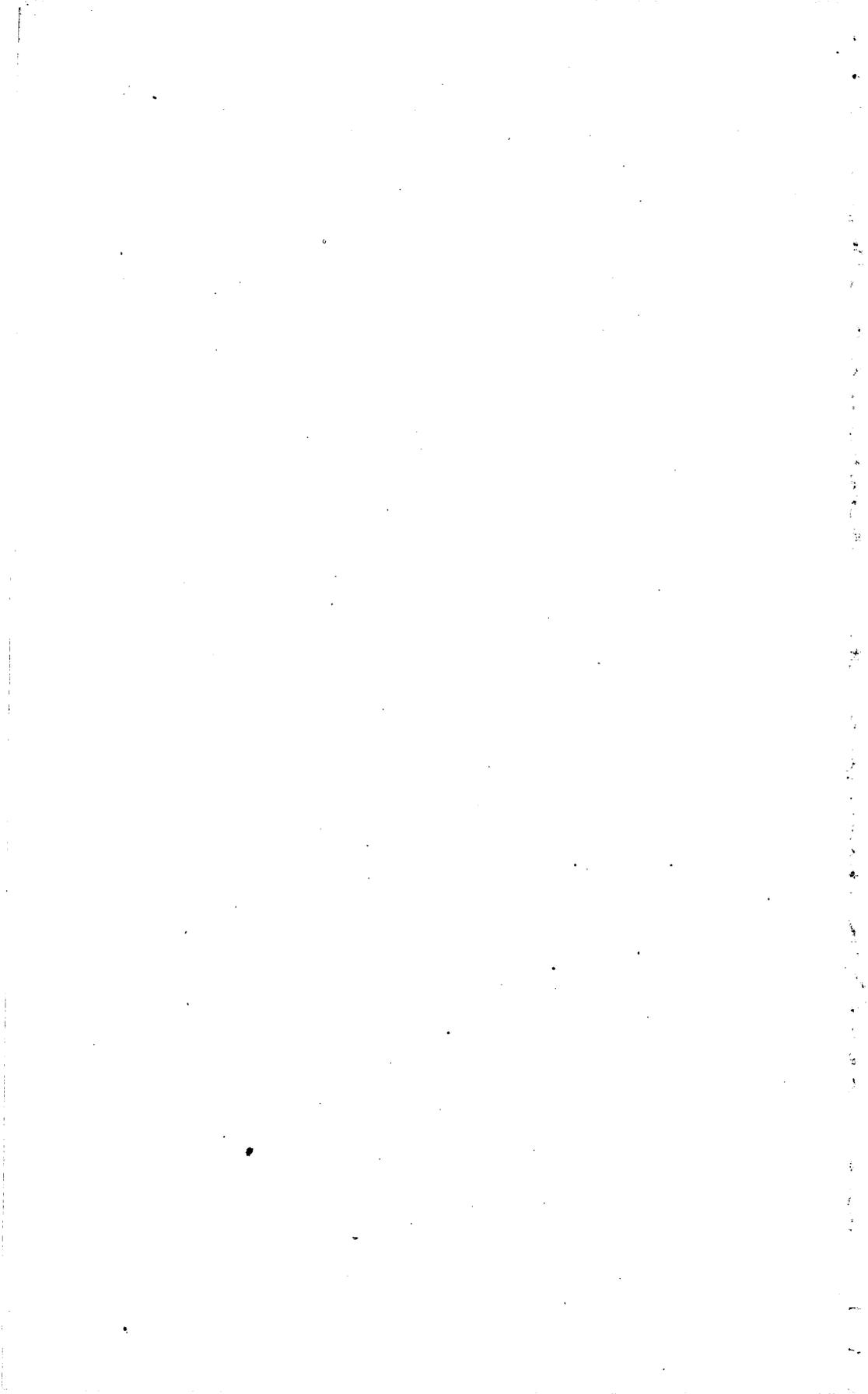
PARK COUNTY.

14756	3.4	A.....	10.7	a38.0	44.0	7.3	0.35	.....	.....	.....	.....	6,150	11,070
		B.....	7.5	39.3	45.6	7.6	.36	.....	.....	.....	.....	6,370	11,460
		C.....	.....	42.5	49.3	8.2	.39	.....	.....	.....	.....	6,885	12,390
		D.....	.....	46.3	53.7	.....	.42	.....	.....	.....	.....	7,505	13,510

CANADA.

ALBERTA PROVINCE.

14882	2.0	A.....	9.8	40.1	43.3	6.77	0.71	5.60	64.99	1.73	20.20	6,340	11,410
		B.....	7.9	41.0	44.2	6.91	.72	5.49	66.32	1.77	18.79	6,470	11,640
		C.....	.....	44.5	48.0	7.50	.79	5.00	72.04	1.92	12.75	7,030	12,650
		D.....	.....	48.1	51.9	.....	.85	5.41	77.88	2.08	13.78	7,600	13,680
14883	2.8	A.....	10.6	36.4	36.3	16.73	.89	5.15	55.94	1.44	19.85	5,455	9,820
		B.....	8.0	37.5	37.3	17.21	.92	4.98	57.55	1.48	17.86	5,610	10,100
		C.....	40.8	40.5	18.71	1.00	4.45	62.55	1.61	11.68	6,100	10,980
		D.....	50.1	49.9	1.23	5.47	76.95	1.98	14.37	7,505	13,510



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