Text to accompany:

Open-File Report 78-060

1978

COAL RESOURCE OCCURRENCE MAPS OF THE SEMINOE DAM SW QUADRANGLE, CARBON COUNTY, WYOMING

(Report includes 3 plates)

Prepared for:

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INTRODUCTION

Purpose

This text is to be used along with the accompanying Coal Resource Occurrence (CRO) Maps of the Seminoe Dam SW quadrangle, Carbon County, Wyoming (3 plates; U.S. Geol. Survey Open-File Report 78-060), prepared by Texas Instruments Incorporated under contract to the U.S. Geological Survey. This report was prepared to support the land planning work of the U.S. Bureau of Land Management's Energy Minerals Activities Recommendation System (EMARS) program, and to contribute to a systematic coal resource inventory of Federal coal lands in Known Recoverable Coal Resource Areas (KRCRA's) in the western United States. The Coal Resource Occurrence maps for this quadrangle cover part of the northwestern portion of the KRCRA of the Hanna coal field. The lack of correlatable coal of Reserve Base thickness in this quadrangle, as indicated on the CRO maps, precluded the construction of Coal Development Potential (CDP) maps which normally accompany this type of report.

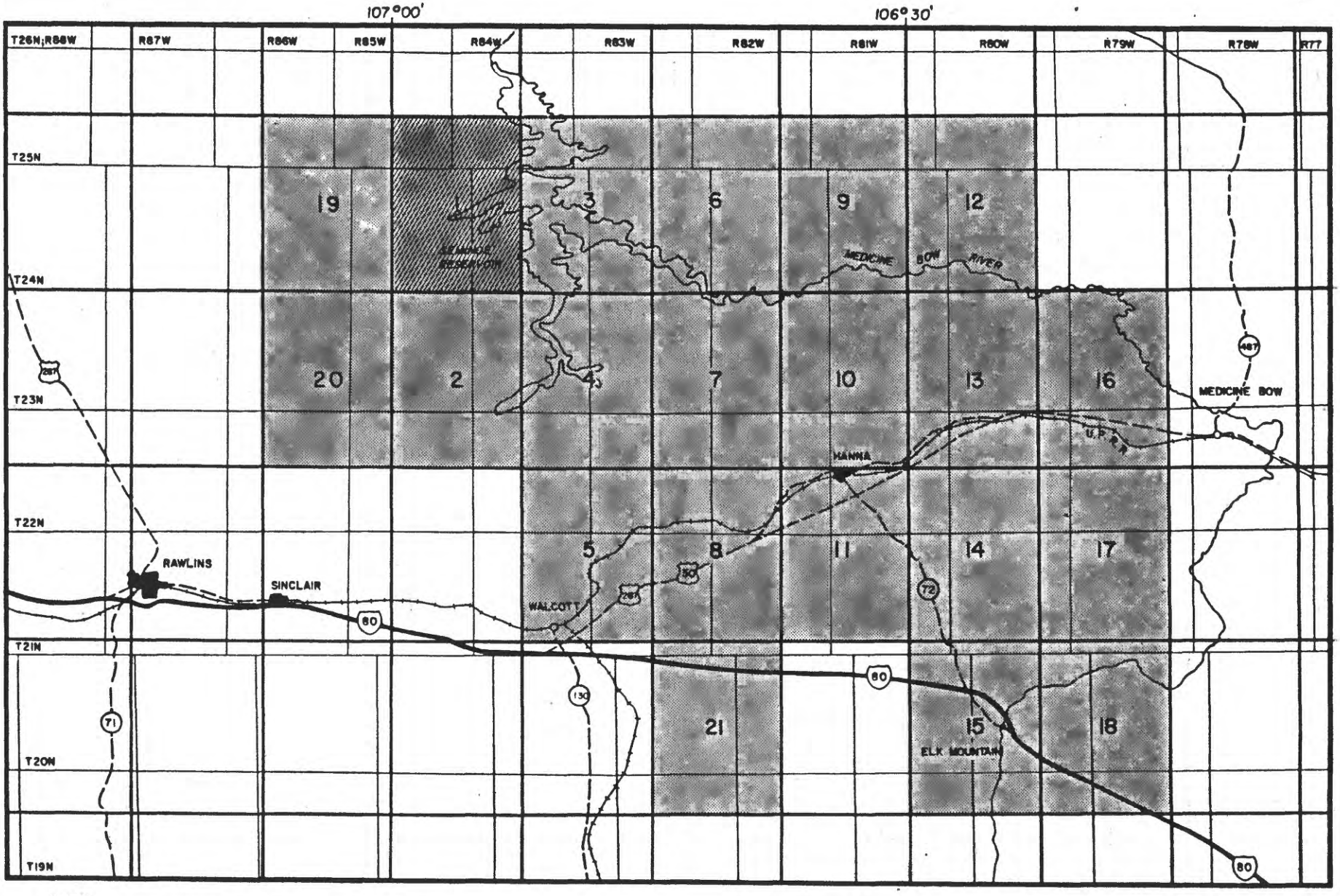
Acknowledgment

Texas Instruments Incorporated acknowledges the cooperation of the Rocky Mountain Energy Company, a wholly owned subsidiary of the Union Pacific Railroad Company, in supplying copies of survey sheets, drillers reports, electric logs, and coal analyses from the Union Pacific coal inventory program.

The Hanna and Carbon coal basins were studied as part of the Union Pacific coal inventory program and test drilling was conducted in 1970-1971. More than 650 Union Pacific coal drill holes have been evaluated as part of this contract study of 21 quadrangles in Carbon County, Wyoming, and the results of 230 coal analyses have been incorporated into these reports.

Location

The Seminoe Dam SW 7 ½-minute quadrangle is in the northwestern part of Carbon County, Wyoming. The center of the quadrangle is approximately 25 miles (40 km) northeast of Rawlins and 24 miles (38 km) northwest of Hanna, Wyoming (Figure 1).



Seminoe Dam SW quadrangle (1)

Scale 1:446,000

Figure 1. — Map of Hanna and Carbon Basins study area

Accessibility

Seminoe Road, classified as a secondary highway, crosses the quadrangle from southwest to northeast and connects with State Highway 220 to the north and State Highway 487 to the northeast. To the south, it connects with Interstate Highway 80 at Sinclair, Wyoming. Several local unimproved dirt roads provide access east and west from Seminoe Road. An airstrip for light aircraft is located in the northern part of sec. 1, T. 24 N., R. 85 W.

The main east-west track of the Union Pacific Railroad is 17 miles (27 km) south of the quadrangle and passes through the towns of Hanna, Sinclair, and Rawlins.

Physiography

The quadrangle is on the northwest edge of the Hanna structural basin which, in this area, is bounded on the north by the Seminoe Mountains and on the west by the Haystack Mountains. In the northern part of the quadrangle, several long, west-trending ridges with a maximum relief of 500 feet (152 m) form foothills parallel to the south flank of the Seminoe Mountains. The southern part of the quadrangle consists of undulating topography typical of high plains grasslands. Part of Seminoe Reservoir, formed by impoundment of the North Platte River behind Seminoe Dam, inundates areas along the northeast and east-central edge of the quadrangle. All the area within this quadrangle is drained by small intermittent streams which flow east or northeast into Seminoe Reservoir. Elevations within the quadrangle range from 6,358 feet (1,938 m) at the Seminoe Dam spillway to 7,280 feet (2,219 m) along the crest of Cheyenne Ridge on the west side of the quadrangle.

Climate

The climate is semiarid with a mean annual temperature of 43°F (6°C) and extremes ranging from 98°F (37°C) to -31°F (-35°C) as recorded at the Seminoe Dam Weather Substation (U.S. Dept. of Interior, 1975). Average annual precipitation at that location is 12 inches (30 cm). Forty-two percent of the precipitation falls as rain in April, May, and June, with the major portion of the remainder falling as snow in the winter months. High winds commonly occur throughout most of the year. The average growing season is generally 60 to 70 days, from late April to early June. High temperatures

and lack of precipitation restrict vegetative growth in late summer and frosts occur from September through April.

Land Status

The quadrangle is in the extreme northwestern part of the Hanna and Carbon Basins Known Recoverable Coal Resource Area. The Federal Government owns approximately 65 percent of the coal rights in the quadrangle; the remaining 35 percent is privately owned. Approximately 20 percent of the area of the quadrangle is included in the KRCRA, and within this region about 45 percent of the land is federally owned. Two abandoned underground mines are shown in Plate 1: the O'Brien Spring mine (sec. 9, T. 24 N., R. 85 W.) and the Miller mine (sec. 35, T. 25 N., R. 85 W.). There are no known active leases, permits or licenses, and no known active mining operations. Plate 2 of the CRO maps illustrates the ownership status of land in the quadrangle and the boundary of the KRCRA.

GENERAL GEOLOGY

Previous Work

Dobbin, Bowen, and Hoots (1929) mapped the area immediately to the east and south of the quadrangle and reported on the coal and oil resources of the Hanna and Carbon Basins. Weitz and Love (1952) compiled a geological map of Carbon County which incorporates available data, published and unpublished, to that date.

Merewether (1972) mapped the geology of this quadrangle from 1966 to 1968. His map and sections served as the primary source for the following summary.

Stratigraphy

Rocks exposed in the quadrangle range in age from Triassic to Quaternary; however, the Tertiary, which contains most of the coal in the Hanna Basin (the Hanna Formation), is not present here. Coal beds in the Seminoe Dam SW quadrangle are found in the lower part of the Medicine Bow Formation and the upper part of the Mesaverde Group, both of Upper Cretaceous age.

Triassic and Jurassic rocks at the southern edge of the Seminoe Mountains are exposed in a narrow strip along the extreme northern edge of the quadrangle and are about 920 feet (280 m) thick. These rocks include the upper part of the Chugwater Group (Triassic), the Nugget Sandstone (Triassic), and the Sundance and Morrison Formations (Jurassic).

The rocks exposed in the northern half of the quadrangle are predominantly marine sediments of Cretaceous age totaling 5,350 feet (1,631 m) in thickness. Included are the Lower Cretaceous Cloverly, Thermopolis, and Mowry Formations, and the Upper Cretaceous Frontier Formation, Niobrara Formation, Steele Shale, and Haystack Mountains Formation. The Haystack Mountains Formation is the oldest formation in the Mesaverde Group (Gill and others, 1970, p. 5). Depositional conditions changed from marine to primarily nonmarine at the close of Haystack Mountains time.

The upper part of the Mesaverde Group comprises the Allen Ridge Formation, the Pine Ridge Sandstone and the Almond Formation. The Allen Ridge Formation, which contains coal beds, is approximately 1,240 feet (378 m) thick in the mapped area and consists of a thick sequence of brown fluviatile sandstones and shales interbedded with carbonaceous shales and coal beds. The Pine Ridge Sandstone overlies the Allen Ridge Formation, is approximately 180 feet (55 m) thick, and consists mostly of light-yellowish-gray fine-grained sandstones with lesser amounts of sandy carbonaceous shales, bentonite lenses, and thin coal beds. Overlying the Pine Ridge Sandstone is the Almond Formation which is about 510 feet (155 m) thick in the mapped area. The lower part consists of yellowish-gray fluviatile sandstones, brownish-gray carbonaceous shales, and coal beds. The upper part of the Almond Formation is composed of brackish-water to shallow-marine thin-bedded very fine-grained white to gray sandstones and olive-gray shales containing limestone concretions with marine fossils.

Marine conditions continued with the deposition of the Upper Cretaceous Lewis Shale, overlying the Mesaverde Group. This formation is about 2,300 feet (701 m) thick and consists mainly of dark gray marine shales interbedded with thick beds of gray-to-brown fine-grained sandstones and lesser amounts of yellowish-gray siltstones.

The Fox Hills Formation, which overlies the Lewis Shale, was deposited during a transition from marine to nonmarine conditions. It is approximately 470 feet (143 m) thick and consists of yellowish-gray fine-grained friable sandstones interbedded with dark-gray sandy shales and lesser amounts of thin carbonaceous shales and beds of impure coal.

The Upper Cretaceous Medicine Bow Formation overlies the Fox Hills Formation and contains 4,870 feet (1,484 m) of continental sediments. It includes brown thin-bedded to massive fluviatile sandstones, siltstones, and gray shales (in part carbonaceous). At least 22 coal beds occur in the lower part of the formation within this quadrangle.

Overlying the Medicine Bow Formation is the Ferris Formation which is also continental in origin. Only the lower 250 feet (76 m) of the formation, a fine- to medium-grained sandstone unit, are exposed in this quadrangle. Coal beds occur in the Ferris Formation east of this quadrangle, but at a higher stratigraphic level than that of the exposures here.

Scattered exposures of unconsolidated Quaternary deposits overlie all of the older rocks in the quadrangle.

Structure

The Seminoe Dam SW quadrangle is on the northwestern edge of the intermontane Hanna Basin which is comparatively small in areal extent, but very deep. The basin extends about 40 miles (64 km) east-west, 25 miles (40 km) north-south, and in its central portion contains approximately 30,000-35,000 feet (9,140-10,670 m) of sediments overlying crystalline basement. It is bounded on the north by the Sweetwater Arch, on the west by the Rawlins Uplift, on the south by the Medicine Bow Mountains, and on the east by the Saddleback Hills Anticline that separates it from the Carbon Basin.

The principal deformation defining the present structural basin occurred during the Laramide Orogeny. The bordering highlands were raised and deformed, and sediments accumulated rapidly in the basin; consequently, the present Hanna Basin has complexly folded and faulted borders, with relatively mild deformation within the basin expressed by a few broad folds and normal faults. With the retreat of the sea in late Haystack Mountains time,

and again in Fox Hills time, depositional environments changed from marine to continental.

Several large folds, many faults, and steeply dipping beds which are typical of the borders of the structural basin are present in the northern half and western edge of the Seminoe Dam SW quadrangle. The principal structures are the O'Brien Springs anticline, with an east-west axial trend and a plunge to the east, and the Camp Creek syncline immediately to the north, also with an east-west axial trend. The remainder of the quadrangle is characterized by fewer faults and much gentler dips.

COAL GEOLOGY

Previous Work

The coal deposits of the Hanna and Carbon Basins have been studied by Veatch (1907), Dobbin, Bowen, and Hoots (1929), Berryhill and others (1950), and Glass (1972 and 1975).

Twenty-six coal analyses have been published since 1913 for coal beds of the Mesaverde Group and the Medicine Bow, Ferris, and Hanna Formations within the Hanna and Carbon Basins (Appendices 1 and 2). Samples collected and analyzed prior to 1913 have not been considered in this report (American Society for Testing and Materials, 1977, p. 218). An average analysis of coal beds in each of these four stratigraphic units has also been calculated from the 230 analyses included in the Union Pacific coal inventory program (Appendices 1 and 2).

Glass (1975) and U.S. Department of Interior (1975) published not only proximate analyses for 17 samples collected in the Hanna Basin, but also assays for 10 major and minor oxides, 12 major and minor elements, and 32 trace elements. Glass (1975, p. 1) stresses that his assay data are insufficient to characterize the chemical and physical properties of any individual coal bed, but this will be possible at a later date as the study continues. Assay results of the 12 Hanna Basin samples show that these coals contain no significantly greater amounts of trace elements of environmental concern than are found in the 42 samples collected in six other Wyoming coal fields.

Fifteen samples of Hanna Basin coals, collected by the U.S. Geological Survey as part of the EMRIA (Energy Mineral Rehabilitation Inventory and

Analysis) study in the Hanna Basin (U.S. Dept. of Interior, 1975, p. 48-59), were also assayed for 10 major and minor oxides, 12 major and minor elements, and 32 trace elements. Proximate analyses of five of the coal samples are included in Appendices 1 and 2.

General Features

In the Seminoe Dam SW quadrangle, three formations in the Mesaverde Group have surface-mapped coal occurrences which tend to be thin and discontinuous. These include the Allen Ridge Formation, the Pine Ridge Sandstone, and the Almond Formation (Merewether, 1972). Coal beds in the Allen Ridge and Almond Formations have also been encountered in oil wells drilled in the quadrangle (Plates 1 and 3).

One surface outcrop of coal has been mapped in the Fox Hills Formation, and a local coal lens in this formation has been noted in several oil wells (local lens L, Plates 1 and 3).

Twenty-two coal beds have been identified in the Medicine Bow Formation (beds MB1 through MB20, Plates 1 and 3) primarily by means of subsurface information derived from published oil well logs and unpublished coal drill hole logs (written communication, Rocky Mountain Energy Company, 1977). Only short segments of the surface exposures of some of these beds (Plate 1) have been traced laterally and, consequently, the majority of these isolated occurrences cannot be accurately correlated with the subsurface data.

Mesaverde Coal Beds

The three coal beds in the Allen Ridge Formation, AR1, AR2, and AR3 (Plates 1 and 3), were mapped from an oil well log. Several isolated coal outcrops noted on the surface geological map (Merewether, 1972) cannot be correlated with subsurface information. Bed AR3, with a thickness of 9 feet (2.7 m), is present approximately 63 feet (19 m) below the surface in well number 26 (Plates 1 and 3). Bed AR2 is 8 feet (2.4 m) thick at 438 feet (134 m) below AR3, and bed AR1, also with a thickness of 8 feet (2.4 m), occurs 579 feet (176 m) below AR2 in this well. The coal beds dip from 25° to 40°S. as estimated from outcrop dips of the enclosing rocks. No analyses

are known to have been published for these coal beds, but they probably conform to the norm for Mesaverde coal (Appendix 2).

Merewether (1972) shows several isolated coal outcrops in the Pine Ridge Sandstone. None of these exceed 5 feet (1.5 m) in thickness. Two oil wells in this quadrangle penetrate the Pine Ridge Sandstone; however, no coal beds can be recognized at this horizon on the electric logs. Merewether (1972) reports an abandoned mine (the O'Brien Spring mine, sec. 9, T. 24 N., R. 85 W.) with a 3.3-foot (1.0-m) coal bed in the Pine Ridge Sandstone. Glass (1972) indicates that the mine was active prior to 1907; a 5-foot (1.5-m) bed was mined, but the quantity of coal produced and the operator's name are unknown.

Several coal outcrops within the Almond Formation are mapped by Merewether (1972) in the Seminoe Dam SW quadrangle. In sec. 34, T. 25 N., R. 84 W., one outcrop is reported to have a thickness of 8.7 feet (2.7 m) and can be correlated with bed 112-B mapped by Dobbin, Bowen, and Hoots (1929) in the adjoining Seminoe Dam SE quadrangle. The bed in this region dips 65°-80°S. Well number 2 (Plates 1 and 3) intersected a 7-foot (2-m) coal bed (A1) in the Almond at a depth of 5,408 feet (1,648 m).

Chemical analysis of Mesaverde coal.--No chemical analyses are published for the Mesaverde coal in the Seminoe Dam SW quadrangle. It can be assumed, however, that the coal is similar to analyses of Mesaverde coal at other locations in the Hanna Basin (Appendix 2), with a rank of subbituminous A or high volatile C bituminous, depending on its agglomerating character.

Fox Hills Coal Beds

Merewether (1972) shows one surface exposure of 1.2 feet (0.4 m) of coal which appears to be in the extreme upper part of the Fox Hills Formation. Lenses of coal from 1 to 2 feet (0.3 to 0.6 m) thick also are present in the upper Fox Hills in four of the oil wells drilled in this quadrangle.

In surface mapping to the south and east of this quadrangle, Dobbin, Bowen, and Hoots (1929, p. 23 and 24) noted a unit in the lower Medicine Bow Formation which probably is equivalent to the Fox Hills Formation, but they did not map it as such.

Chemical analysis of Fox Hills coal.--No chemical analyses are reported for Fox Hills coal in the quadrangle. It is believed, however, that the coal is similar in quality to the coals of the overlying Medicine Bow Formation.

Medicine Bow Coal Beds

A number of surface exposures of coal are noted by Merewether (1972) in the lower part of the Medicine Bow Formation. Only a few of these outcrops were traced along the surface, and then generally only for distances of less than a mile. Correlation of subsurface data from five oil wells and nine coal drill holes with a surface measured section (Merewether, 1972) establishes the presence of 22 coal beds and several local coal lenses in the Medicine Bow Formation. In general, the coal beds are thin, 5 feet (1.5 m) or less of measured coal, but they may increase locally in thickness to as much as 8 feet (2.4 m). Medicine Bow coal beds generally dip 30° to 45° at the outcrops. Toward the basin, dips decrease to between 5° and 10°, but the overburden increases to 600 to 800 feet (183 to 244 m).

Merewether (1972) shows an abandoned underground mine (Miller mine, sec. 35, T. 25 N., R. 85 W.) in the Medicine Bow Formation with a coal bed thickness of 12.2 feet (3.7 m). Glass (1972) reports a thickness of 11.5 feet (3.5 m) for the coal bed at that mine and states that the mine produced 1,229 tons (1,115 t) of coal from 1932-36. Operators included M. and D.V. Miller, Merl Miller, C.B. and H. Coal Co., George Houston, and J.R. Christy. The coal bed is close to the axis of the Camp Creek syncline and dips 65° NNE.

Chemical analysis of Medicine Bow coal.--Two analyses have been reported by Rocky Mountain Energy Company (written communication, 1977) for Medicine Bow coal in the quadrangle. The analyses were performed on cored intervals of beds MB10 and MB11 in coal drill hole number 11 (Plates 1 and 3, Appendix 3).

Berryhill and others (1950, p. 22) report that Medicine Bow coal ranks as subbituminous A and that the average of two analyses, on an as-received basis, shows 3.8 percent ash, 0.8 percent sulfur, and 11,050 Btu. The average of 16 analyses from the Union Pacific coal evaluation program (Appendix 2) shows a similar apparent rank.

COAL RESOURCES

Previous Work

Coal reserves of the Hanna and Carbon Basins have been estimated or calculated by Dobbin, Bowen, and Hoots (1929), Berryhill and others (1950), and Glass (1972).

Method of Calculating Resources

Data from Merewether (1972), oil and gas well logs, and coal drill holes (written communication, Rocky Mountain Energy Company, 1977) were used to construct the Coal Data Map (Plate 1) and the Coal Data Sheet (Plate 3) for the Seminoe Dam SW quadrangle. U.S. Geological Survey reviewed these two plates and concluded that no individual coal bed or coal zone on unleased Federal land within the KRCRA was thick enough and extensive enough to be selected for coal reserve evaluation. However, an approximate calculation of coal Reserve Base was made for the isolated or noncorrelatable data points in the quadrangle.

The information on Plates 1 and 3 served as the basis for estimating coal resources in areas of sparse, isolated coal data, insufficient to construct isopach and structure contour maps. The estimates of coal resources within the KRCRA boundary were made in accordance with the classification system given in U.S. Geological Survey Bulletin 1450-B and by following methods suggested by the U.S. Geological Survey:

- All outcrop measurements and subsurface measurements are considered as one planar unit.
- All coal deeper than 3,000 feet (914 m) is excluded.
- Coal bed thicknesses from surface mapping are true thicknesses; thicknesses from subsurface data are apparent thicknesses. No corrections were made for coal bed thicknesses to compensate for the dip of the containing rocks.
- Coal resources are calculated for a single coal bed at least 5 feet (1.5 m) thick or for an aggregate thickness of multiple coal beds each at least 5 feet (1.5 m) thick.
- Areal subsurface distribution of coal from outcrop data points is determined by constructing an arc with a radius equal to

one-half the length of the outcrop within a five-foot or greater thickness limit, and centered on a point midway on the outcrop.

- Areal subsurface distribution for a subsurface data point with a five-foot or greater thickness of coal is defined by a circle with a radius of 0.5 mile (805 m).

- Coal resources at depths of less than 200 feet (61 m) are tabulated separately from coal resources at depths between 200 and 3,000 feet (61 and 914 m).

When estimating coal resources in areas of sparse, isolated data some data require a unique solution. For example:

- Where a coal bed outcrop has data points with a coal thickness less than 5 feet (1.5 m), a 5-foot (1.5 m) cut-off point is interpolated, and the resulting segments with values greater than 5 feet (1.5 m) are used to generate arcs (radii equal to half the partial outcrop length).

- Where areas within outcrop segment arcs and areas within 0.5 mile (805 m) of a drill hole coincide, the areas are combined, and drill hole coal thickness values are averaged with outcrop coal thickness values.

- When evaluating multiple coal beds of an isolated or noncorrelatable data point, the interburden between subsurface coal beds may be too great to allow the aggregate thickness of coal to be considered as one planar unit. In such instances, a conservative judgment is made and the resources for each bed are calculated separately and then totaled.

Results

The coal resource acreage from isolated or noncorrelatable data points was determined by planimetering the areas which occurred in unleased Federal land within the KRCRA boundary. Coal Reserve Base values were obtained by multiplying the coal resource acreage for each section of Federal land by the average thickness of the coal bed, or the average aggregate thickness of multiple coal beds, times a conversion factor of 1,770 short tons (1,606 t) of coal per acre-foot for subbituminous coal. Reserve Base values are shown on Plate 2 and are considered to be in the inferred reliability category of identified coal resources.

The total coal Reserve Base of unleased Federal lands within the KRCRA in the Seminoe Dam SW quadrangle is 0.2 million short tons (0.18 million t) of inferred resources with 0-200 feet (0-61 m) overburden; 8.1 million short

tons (7.35 million t) of inferred resources with 200 to 3000-feet (61 to 914 m) overburden. Coal reserves were not calculated and, therefore, the coal development potential could not be assessed. The coal Reserve Base data are for rough inventory estimates only.

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Appendix 1. — Average analyses of coal samples from the Hanna and Carbon Basins

Source of Data	Number of samples (1)	Total footage Ft	in	Average analyses — as-received basis, Percent: Moisture	Ash	Volatile matter	Fixed carbon	Sulfur	Btu/lb	Calorific Value, Btu/lb Moist, mineral-matter-free basis (2)	Apparent rank of coal (3)
Published analyses	26	318	6	12.5	7.1	36.2	44.2	0.6	10,553	11,438	sub A or hvCb
Union Pacific coal inventory program	230	1,605	10	12.48	8.74	35.12	43.68	0.82	10,398	11,494	sub A or hvCb

Notes:

(1) Published data from USBM (1931, p. 40-45, sample nos. 2623, 2624, 22800, 22972, 93486, 93488, 93541, A14123, A14124); Glass (1975, p. 16-19, sample nos. 74-23 to 74-34, inclusive); Dept. of Interior (1975, p. 38, sample nos. D169597-99, D169607-08). Union Pacific coal inventory program data from company files, Rocky Mountain Energy Company (1977).

(2) Moist, mineral-matter-free Btu/lb calculated from average analyses, as-received basis, using Parr formula (ASTM, 1977, p. 216, sec. 8.2).

(3) Sub A — subbituminous A; hvCb — high volatile C bituminous (ASTM, 1977, p. 215, sec 4.2, and p. 217).

[To convert feet and inches to meters, multiply feet by 0.3048 and inches by 0.0254. To convert Btu/lb to kilojoule/kilogram, multiply by 2.326].

Appendix 2. — Average analyses of coal grouped by coal-bearing formations in the Hanna and Carbon Basins

Source of data	Formation or Group	Number of samples (1)	Total footage Ft	Total footage in	Average analyses — as-received basis: Percent: Moisture	Ash	Volatile matter	Fixed carbon	Sulfur	Btu/lb	Calorific Value, Btu/lb: Moist, mineral-matter-free basis (2)	Apparent rank of coal (3)
Published analyses	Mesaverde	1	4	0	14.1	7.8	36.5	41.6	1.1	10,290	11,251	sub A or hvCb
	Medicine Bow	2	10	1	12.8	3.8	33.3	50.2	0.8	11,050	11,534	hvCb
	Ferris	10	93	1	.13.0	8.3	34.3	44.3	0.4	9,970	10,956	sub A or hvCb
	Hanna	13	211	4	12.0	6.6	38.1	43.3	0.7	11,946	11,797	hvCb
Union Pacific coal inventory program	Mesaverde	13	70	5	9.45	8.41	35.42	46.72	0.77	11,112	12,237	hvCb
	Medicine Bow	16	93	4	13.09	4.03	35.46	47.42	0.80	10,927	11,446	sub A or hvCb
	Ferris	114	863	1	12.69	7.96	34.39	44.97	0.44	10,331	11,309	sub A or hvCb
	Hanna	87	579	0	12.51	10.67	35.96	40.85	1.33	10,280	11,640	hvCb

Notes:

(1) Published data from USBM (1931, p. 40-45, sample nos. 2623, 2624, 22800, 22972, 93486, 93488, 93541, A14123, A14124); Glass (1975, p. 16-19, sample nos. 74-23 to 74-34, inclusive); Dept. of Interior (1975, p. 38, sample nos. D169597-99, D169607-08). Union Pacific coal inventory program data from company files, Rocky Mountain Energy Company (1977).

(2) Moist, mineral-matter-free Btu/lb calculated from average analyses, as-received basis, using Parr formula (ASTM, 1977, p. 216, sec. 8.2).

(3) Sub A — subbituminous A; hvCb — high volatile C bituminous (ASTM, 1977, p. 215, sec. 4.2, and p. 217).

[To convert feet and inches to meters, multiply feet by 0.3048 and inches by 0.0254. To convert Btu/lb to kilojoule/kilogram, multiply by 2.326].

Appendix 3. — Coal analyses, Seminoe Dam SW quadrangle

Drill hole	Location			Coal bed	Sample interval				Sample width		Analyses — as-received basis					
					From		To				Percent					
	Sec.	Twp.	Rge.		Ft	in	Ft	in	Ft	in	Moisture	Ash	Volatile matter	Fixed carbon	Sulfur	Btu/lb
11	15	24N	85W	MB11	392	3	401	1	8	10	16.14	3.88	34.37	45.61	0.34	10,315
11	15	24N	85W	MB10	406	7	411	0	4	5	16.89	5.78	32.61	44.72	0.42	9,932

Data from Rocky Mountain Energy Company (1977).

[To convert feet and inches to meters (m), multiply feet by 0.3048 and inches by 0.0254. To convert Btu/lb to kilojoules/kilogram (kJ/kg), multiply by 2.326].