Text to accompany:

Open-File Report 78-059

1978

COAL RESOURCE OCCURRENCE MAPS OF THE SCHNEIDER RIDGE QUADRANGLE, CARBON COUNTY, WYOMING

(Report includes 3 plates)

Prepared for:

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

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ILLUSTRATIONS

[Plates are in pocket]

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INTRODUCTION

Purpose

This text is to be used along with the accompanying Coal Resource Occurrence (CRO) Maps of the Schneider Ridge quadrangle, Carbon County, Wyoming (3 plates; U.S. Geol. Survey Open-File Report 78-059), 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.

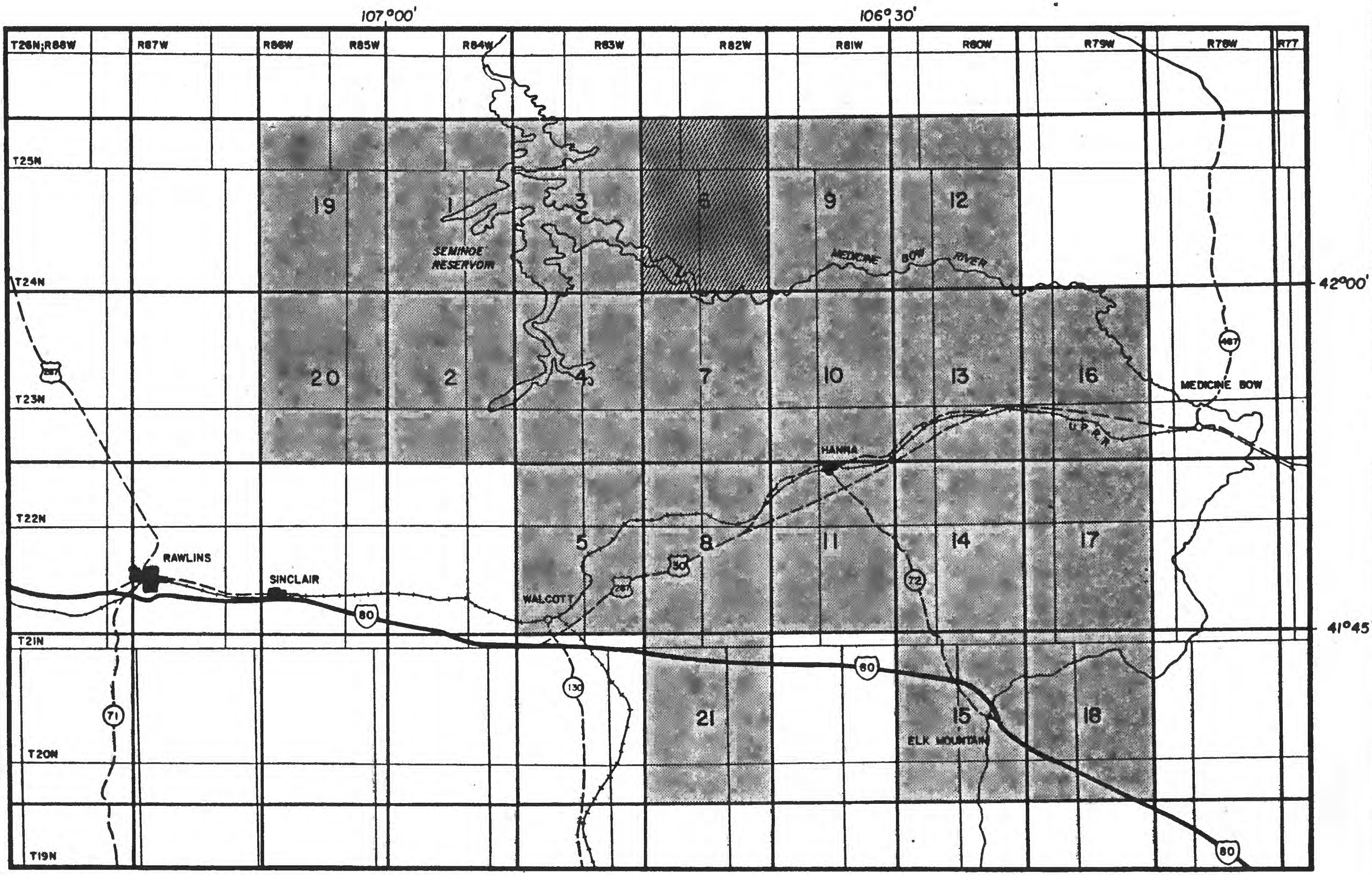
Acknowledgment

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 and 230 coal analyses have been incorporated into these reports.

Location

The Schneider Ridge 7½-minute quadrangle is in the northeastern part of Carbon County, Wyoming. The center of the quadrangle is approximately 30 miles (48 km) northeast of Sinclair and 15 miles (24 km) northwest of Hanna, Wyoming (Figure 1).



Schneider Ridge quadrangle (6)

Scale 1:446,000

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

Accessibility

Access to the Schneider Ridge quadrangle from Hanna and Medicine Bow, 15 miles (24 km) to the south-southeast and 28 miles (45 km) to the southeast of the center of the quadrangle, respectively, is provided by a light-duty road which enters the quadrangle at the southeast border (sec. 22, T.24N., R.82W.). This road crosses the southern half of the quadrangle in a westerly direction, turns north to cross Austin Creek, and passes west of Schneider Ridge and east of Horseshoe Ridge. Immediately north of Horseshoe Ridge the road forks. The left-hand fork traverses northwesterly to provide access to Seminoe Dam, 12 miles (19 km) northwest of the center of this quadrangle; the right-hand fork continues due north via the village of Leo to Alcova, a town 34 miles (55 km) north of the center of this quadrangle, on State Highway 220. Several unimproved dirt roads provide access from the main light-duty road to the ranches and water holes in the quadrangle and to the shores of Seminoe Reservoir.

The main east-west track of the Union Pacific Railroad passes 16 miles (26 km) south of the center of the quadrangle, connecting the towns of Medicine Bow, Hanna, Walcott, Sinclair, and Rawlins.

Physiography

The quadrangle is located on the north rim of the Hanna structural basin. In this area, the Hanna Basin is bounded on the north by the Shirley Mountains and the east end of the Seminoe Mountains. Topography of the northern two-thirds of the quadrangle is typical of the foothills south of the flanking mountain ranges to the north. In the northeast part of the quadrangle the terrain is elevated, rugged, and deeply dissected by several streams flowing southwest to Seminoe Reservoir. The highest elevations in the quadrangle occur here, culminating in ground above 8,360 feet (2,548 m) in the extreme northeast. Further south, in the central part of the quadrangle, several west-trending ridges are the dominant features. Horseshoe Ridge and Schneider Ridge are the most prominent, with a local relief of 300 to 400 feet (91 to 122 m). The southern third of the quadrangle which borders Seminoe Reservoir and Medicine Bow River, is rolling topography that is typical of the dissected high plains grasslands of the Hanna and Carbon Basins.

and oil resources of the Hanna and Carbon Basins. Berta (1951) reviewed the general stratigraphy and structure of the Hanna coal field. Weitz and Love (1952) compiled a geologic map of Carbon County, Wyoming, which incorporates available data, published and unpublished, to that date. Gill, Merewether, and Cobban (1970) defined and correlated the upper Cretaceous and lower Tertiary rocks of south-central Wyoming, including the stratigraphic units that are exposed in this quadrangle. The geology of the quadrangles adjoining on the west and southwest has been mapped more recently by Blanchard and Jones (1976) and by Blanchard and Comstock (1976), respectively.

Stratigraphy

Rocks exposed in the quadrangle range in age from Precambrian to Quaternary. Coal beds are found in the lower part of the Medicine Bow Formation of Late Cretaceous age and in the Ferris Formation of Late Cretaceous/Paleocene age.

Granite is the dominant rock type of the Precambrian rocks that form the core of the Seminoe Mountains and the Shirley Mountains. Within the quadrangle, outcrops are confined to: (a) that part of the northeast quadrant where elevations in the Shirley Mountains exceed 7,200 feet (2,195 m), and (b) a small area in the extreme northwest, immediately east of Beaver Jimmy Creek, also at more than 7,200 feet (2,195 m) elevation, where the eastern end of the Seminoe Mountains extends into this quadrangle. The Shirley Mountains granite is cut by pegmatites, basic dikes, quartz veins, and fault zones; granite gneisses are common in the eastern Seminoe Mountains (Finnell, 1951, p. 29). No significant mineral deposits are reported from the Precambrian rocks in this quadrangle.

Sediments older than Cretaceous age crop out in the western part of the northern quarter of the quadrangle. The outcrops are partially mantled by younger deposits of Late Tertiary and Quaternary age but it is most probable that the older sediments are in faulted contact with the Precambrian basement. The stratigraphic sequence, with approximate thickness of the units is as follows:

Drainage of the quadrangle is by creeks and their tributaries flowing generally southwest to the east arm of Seminoe Reservoir and to Medicine Bow River, which meanders westward at the quadrangle's southern boundary. Elevations within the quadrangle range from 6,358 feet (1,938 m), the water level of Seminoe Reservoir, to more than 8,360 feet (2,548 m) in the northeast corner.

Climate

The climate is semiarid with a mean annual temperature of 43°F (6°C) and extremes ranging from 98°F to -31°F (37°C to -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 are common throughout most of the year. The average growing season is generally 60 to 70 days, from early April to mid-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 northern part of the KRCRA of the Hanna coal field. The Federal Government owns 45 percent of the coal rights in the quadrangle; the remaining 55 percent is privately owned. Approximately 9 percent of the area of the quadrangle is included in the KRCRA and within this area about 55 percent of the land is federally owned. Two unnamed abandoned underground mines are shown on Plate 1; one is located in SE sec. 8, T.24N., R.82W. and the other in NE sec. 11, T.24N., R.83W. There are no known active leases, permits, or licenses and no known active mining operations. Plate 2 shows 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 southern two-thirds of the Schneider Ridge quadrangle as part of their study of the geology and coal

Marine conditions returned to the area in Almond time and continued with the deposition of the Lewis Shale of Late Cretaceous age. This formation crops out as a belt of generally east-trending sediments in the northeastern part of T.24N., R.83W. and the northwestern part of T.24N., R.82W., and is partially mantled by younger deposits of Late Tertiary and Quaternary age. The formation is about 3,000 feet (914 m) thick in secs. 2 and 11, T.24N., R.83W. and consists mainly of dark gray shales interbedded with gray to brown fine-grained sandstones, yellowish-gray siltstones, and bentonite lenses.

The Fox Hills Formation conformably overlies the Lewis Shale and represents a transition in depositional conditions from marine to continental. The formation is 350 feet (107 m) thick in the adjoining quadrangle to the west. In this quadrangle it is not mapped as a separate unit by Dobbin, Bowen, and Hoots (1929) but included, in whole or in part, in their underlying Lewis Shale or their overlying Medicine Bow Formation. The Fox Hills sediments consist of yellowish-gray fine-grained friable sandstones interbedded with dark-gray sandy shales and thin-bedded carbonaceous shales.

The Upper Cretaceous Medicine Bow Formation overlies the Lewis Shale as an east-trending belt of steeply dipping continental sediments in the center part of the quadrangle. Dobbin, Bowen, and Hoots (1929) map 4,350 feet (1,326 m) of sediments in secs. 11 and 14, T.24N., R.83W., 3,500 feet (1,067 m) in secs. 7 and 18, T.24N., R.82W., and 3,600 feet (1,097 m) in sec. 9, T.24N., R.82W. Stratigraphic sections of 3,150 and 3,950 feet (960 and 1,204 m), respectively, for the Medicine Bow Formation at the latter two localities, were measured by Knight (1951, p. 50). He restricts the Medicine Bow Formation to the basal, non-conglomeratic part of a thick sequence of conformable continental sediments overlying the Lewis Shale in this area of the Hanna Basin. Medicine Bow sediments consist of yellow-gray and carbonaceous shale, beds of coal, and gray and brown sandstone. The lower part of the formation is made up of massive to cross-bedded brown sandstones, which usually form a conspicuous group of ledges (for example, Schneider Ridge in this quadrangle) and contain numerous beds of coal. These sandstones are overlain by an intermediate group of dark-colored shales and thin-bedded fine-grained brown sandstones, with some beds of massive white sandstone. The sandstones at the top of the formation are

	Unconformity		
Jurassic	Jurassic rocks, undivided	500 feet	(152 m)
	Unconformity		
Triassic	Triassic rocks, undivided	1,150 feet	(351 m)
Permian	Permian rocks, undivided	1,000 feet	(305 m)
Pennsylvanian-Permian	Tensleep and Amsden Formations, undivided	350 feet	(107 m)
	Unconformity		
Mississippian	Madison Limestone	~100 feet?	(~30 m?)
	Unconformity		

Sandstones or quartzites of Late Cambrian age may be present in this quadrangle below the Madison Limestone but no Cambrian beds are reported in outcrop, nor were they intersected in the subsurface by the drill holes evaluated in this contract study. Thomas (1951) reports that the thickness of Cambrian rocks decreases easterly along the south flank of the Sweetwater Arch: near Whiskey Gap, 43 miles (69 km) northwest of the center of this quadrangle, the Cambrian sandstones, siltstones and shales are 754 feet (230 m) thick; near Seminoe Dam, 13 miles (21 km) to the northwest, the Cambrian sandstones are 345 feet (105 m) thick; on Smith Creek, 5 miles (8 km) to the east-northeast, Cambrian quartzites and conglomerates are about 100 feet (30 m) thick.

The marine sediments of pre-Cretaceous age are unconformably overlain by marine sediments of Cretaceous age totaling more than 6,500 feet (1,981 m) in thickness. Included are the Lower Cretaceous Cloverly, Thermopolis, and Mowry Formations and the Upper Cretaceous Frontier, Niobrara, Steele Shale, and Haystack Mountains Formations. The last-named formation is the oldest formation in the Mesaverde Group.

With the close of Haystack Mountains time, depositional conditions in the Hanna Basin area changed from marine to primarily non-marine. The younger formations of the Mesaverde Group (Gill and others, 1970, p.5) are the Allen Ridge Formation, the Pine Ridge Sandstone, and the Almond Formation. From mapping in the adjoining quadrangle to the west (Blanchard and Jones, 1976) the total thickness of the three formations is approximately 2,000 feet (610 m). Coal beds occur in these three formations in the Hanna Basin but, from the mapping of Dobbin, Bowen, and Hoots (1929), not in this quadrangle, Mesaverde coal beds were not intersected in the subsurface by drill holes.

coarse-grained, massive, friable, and easily eroded, and are interbedded with thick beds of dark gray shale.

Conformably overlying the Medicine Bow Formation is the Ferris Formation. This latter formation is exposed across the central part of the quadrangle, south of Schneider Ridge, as a belt of east-trending steeply dipping sediments. The Ferris Formation is about 6,500 feet (1,981 m) thick at its type locality near the old Ferris Ranch on the North Platte River, 15 miles (24 km) southwest of the center of the Schneider Ridge quadrangle. The formation consists of a thick sequence of continental rocks that can be divided into two parts: a lower unit of Late Cretaceous age which is about 1,100 feet (335 m) thick and an upper unit of Paleocene age which is about 5,400 feet (1,646 m) thick. The basal 300 feet (91 m) of the lower unit consists of dark gray shales and buff to yellow coarse-grained friable massive sandstones with irregular thin beds of conglomerate. The overlying 800-foot (244 m) portion of the lower unit is made up largely of conglomerate which occurs as pockets, lenses, and thin beds irregularly distributed throughout the sandstone. The upper unit of the Ferris Formation consists of gray-brown and yellow sandstones interbedded with numerous thick beds of coal. Ferris coal beds are thick and numerous in the western part of the Hanna Basin but, as they extend northeasterly across the east arm of the Seminoe Reservoir into this quadrangle, they thin rapidly and become lens like before disappearing as mappable units in outcrops in sec. 22, T.24N., R.83W.

The Hanna Formation overlies the Ferris Formation, occupies the central portions of the Hanna and Carbon Basins, and contains many of the thick coal beds of the region, particularly in the neighborhood of the town of Hanna. The Hanna Formation is normally not only in unconformable contact with the underlying Ferris Formation, but also transgresses across all underlying formations; this includes the Precambrian basement rocks, for example, in the northern part of the Medicine Bow National Forest 47 miles (76 km) south-southeast of the center of this quadrangle. However, the measured sections of Knight (1951) in T.24N., R.82W. show that in the Schneider Ridge quadrangle the Hanna sediments are the upper part of a thick (13,300 to 17,500 feet, 4,054 to 5,334 m) sequence of conformable continental sediments that terminate at an erosion surface, indicating that the upper part of the Hanna Formation has been eroded. Dobbin, Bowen, and Hoots (1929) first mapped the

Hanna Formation and they consider it to be about 7,000 feet (2,134 m) thick in the Hanna and Carbon Basins. Gill, Merewether, and Cobban (1970), when reviewing the Ferris and Hanna Formations, conclude from the measured sections of Knight (1951) and their own field observations that the Hanna Formation may be as much as 13,500 feet (4,115 m) thick and overlies an eroded Medicine Bow sequence. The Ferris Formation is therefore missing from the measured sections of Knight (1951); yet Dobbin, Bowen, and Hoots (1929) map Ferris coal beds less than 3 miles (5 km) to the west. The Hanna Formation consists of conglomerate, conglomeratic sandstone, sandstone, shale, and many thick beds of coal. The conglomerate occurs throughout the formation but is most abundant in the lower half. Thick conglomeratic sandstone and locally, massive conglomerate mark the base of the formation. The sandstones of the formation range from coarse-grained massive or thick-bedded varieties to fine-grained thin-bedded sandstones which weather brown and split into thin slabs. The coarse-grained varieties are buff to grayish-white, commonly conglomeratic, and highly feldspathic. The conglomerates of the Hanna Formation differ from those of the Ferris in color and in the size and composition of the clasts. Apparently, the conglomerates of the Ferris were derived from a distant source and those of the Hanna from a nearby source (Gill, Merewether, and Cobban, 1970). In the Schneider Ridge quadrangle the Hanna Formation, as mapped by Dobbin, Bowen, and Hoots (1929), crops out in the southern third of the area; no coal beds are mapped, nor were any detected in the subsurface by the drill holes that were evaluated, but these were not located to intersect the upper parts of the formation. The age of the Hanna Formation is in doubt; fossils from the Hanna indicate a late Paleocene age, but in the center of the Hanna Basin the formation may be as old as late-early Paleocene or middle Paleocene.

Sediments of late Tertiary age occur in the northwest part of the Schneider Ridge quadrangle, unconformably overlying sediments of Mesaverde age and older. The sequence, up to 400 feet (122 m) thick, comprises white massive soft tuffaceous sandstones underlain by white blocky tuffaceous claystones and lenticular arkosic conglomerates. These sediments are similar to rocks of middle Miocene age, the Browns Park Formation, described by McGrew (1951) from localities along the southern edge, and to the south, of the Hanna Basin.

Alluvial deposits of Quaternary age occur in the valley bottoms of major water courses - Medicine Bow River, Austin Creek, Saylor Creek, and Homestake Draw, for example. Quaternary terrace deposits are mapped at higher elevations on the south-facing slopes east of Austin Creek and north of Schneider Ridge.

Structure

The Schneider Ridge quadrangle is on the northern edge of the intermontane Hanna Basin. This basin is comparatively small in areal extent but it is one of the deeper structural basins in the Rocky Mountain region. The basin extends about 40 miles (64 km) east-west, 25 miles (40 km) north-south, and in its deepest portion in the southeastern part of T.24N., R.82W. 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 which in this quadrangle is represented by the southeastern end of the Seminoe Mountains and the southwestern part of the Shirley Mountains.

The principal deformation defining the present structural basin occurred during the Laramide Orogeny. The bordering highlands were raised and deformed, and the sediments accumulated rapidly in the basin; consequently, the present Hanna Basin has complexly folded and faulted borders, with mild deformation within the basin expressed by a few broad folds and normal faults. With the retreat of the sea in late Cretaceous time, the depositional environment changed from marine to continental as exemplified by the sediments that crop out over the southern half of this quadrangle.

One of the two major fault systems developed in the Hanna Basin crosses the northern third of this quadrangle in a west-northwesterly direction. From its exposure south of the Oil Springs anticline in the northeast part of T.23N., R.79W., the fault trends west-northwest at the boundary of the basin to enter the Schneider Ridge quadrangle at its east boundary in sec. 3, T.24N., R.82W. Here, the surface trace of the fault is concealed by a mantle of Quaternary and late Tertiary sediments but Paleozoic and Mesozoic sediments of the basin edge are faulted against Precambrian rocks of the Shirley Mountains. Dobbin, Bowen, and Hoots (1929) suggest the vertical displacement of this fault may be as much as 30,000 feet (9,144 m). The fault is exposed in the northwestern corner of the quadrangle where Permian and

Carboniferous sediments are faulted against Precambrian rocks of the Seminoe Mountains. The fault system continues west-northwesterly beyond this quadrangle across at least six townships. Subsidiary north-trending faults branch from the main fault system both to the east and to the west of Homestake Draw, defining the western limit of the Precambrian rocks of the Shirley Mountains and the eastern limit of the Precambrian rocks of the Seminoe Mountains, respectively. Weitz and Love (1952) show minor faulting south of Horseshoe Ridge: a northeast-trending fault at the west boundary of the quadrangle displaces the Medicine Bow/Lewis Shale contact; an east-southeast trending strike fault in the Lewis Shale is located immediately north of the Matson Ranch. Dobbin, Bowen, and Hoots (1929) do not map these two faults.

Dips of the sediments within the quadrangle vary from steeply overturned to the north in the Steele Shale, Mesaverde Formation, and Lewis Shale; vertical and steeply dipping to the south in the Medicine Bow Formation; and a gradual and progressive decrease in dip in the continental sediments overlying the Medicine Bow Formation, from vertical at the basal contact to less than 10° in the southeast corner of the quadrangle.

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 for the 230 analyses from the Union Pacific coal inventory program (Appendices 1 and 2). An apparent rank has been calculated from the average analysis for coal in each of the four stratigraphic units. A standard rank determination (ASTM, 1977, p. 216, sec. 6.2.2) cannot be made because: (a) some of the published analyses are from weathered coal samples, and (b) the procedure and quality of sampling for the Union Pacific coal evaluation program are not known.

Glass (1975) and U.S. Department of Interior (1975) published not only proximate coal analyses for 17 samples collected in the Hanna Basin, but also assays for 10 major and minor oxides, 12 major and minor elements, and up to 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 beds but that this will be possible at a later date as the study continues. Assay results of the 17 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.

General Features

In the Schneider Ridge quadrangle, eight coal beds and six local coal lenses were mapped by Dobbin, Bowen, and Hoots (1929) in the steeply dipping sediments of the Medicine Bow Formation (Plate 1). Also, they measured five sections of coal at isolated outcrops. Ten additional local coal lenses were mapped in the subsurface (Plate 3).

Dobbin, Bowen, and Hoots (1929) mapped four Ferris coal beds in the southwest part of the quadrangle and they state that the Ferris coal beds become more or less irregular, split up into benches, and become thin and bony or are replaced by shale as they are traced northeast across T.24N., R.83W. into this quadrangle. Fourteen local coal lenses in the Ferris Formation were mapped in the subsurface.

Analyses of two samples from Medicine Bow coal beds within this quadrangle are shown in Appendix 3. One sample, taken during the Union Pacific coal inventory program, is from a local coal lens, below coal bed 113, that was intersected in drill hole 4. The other sample was obtained in 1915 from the now abandoned underground mine in sec. 11, T.24N., R.83W. that mined coal bed 116 for local use (Dobbin and others, 1929, p. 60).

Medicine Bow Coal Beds

Coal beds 113 through 120 and local coal lenses SRL 1a, SRL 1 through 5, occur at the base of the formation and crop out with an easterly trend across the center of the quadrangle. Thicknesses of these coal beds and lenses range from 0.7 to 18.7 feet (0.2 to 5.7 m) and average 4.1 feet (1.2 m). An additional ten local coal lenses were mapped in the subsurface; thicknesses intersected in drill holes 1, 2, and 4 are 5 feet (1.5 m) or less, except for one coal lens below coal bed 113 which is 7 and 11 feet (2.1 and 3.4 m) thick in drill holes 2 and 4, respectively. Dobbin, Bowen, and Hoots (1929) also measured five sections of coal in isolated outcrops: 16.5 feet (5 m) of coal with 19 feet (5.8 m) of interburden below coal lens SRL4 in southeast sec. 8, T.24N., R.82W., two outcrops of 3.3 feet (1 m) and 5.0 feet (1.5 m) coal below coal bed 114 in southeast sec. 8 and southwest sec. 9, T.24N., R.82W., and two outcrops of a minor coal lens 30 feet (9 m) below coal bed 116 in southeast sec. 8, T.24N., R.82W. which showed about 9 feet (2.7 m) of coal and 30 feet (9.1 m) of interburden. The first-mentioned outcrop, below coal lens SRL4, is an abnormally thick section of coal in the area. Dobbin, Bowen, and Hoots (1929) suggest that it may represent a local thickening of coal lens SRL3 caused by squeezing and buckling of the strata.

Steep dips are a feature of the Medicine Bow coal beds. At the western border of the quadrangle dip angles are 70^{o} or more to the southwest. Progressing eastwards, the beds steepen to vertical and then become overturned to the north at 84^{o} in the east half of sec. 11, T.24N., R83W; they are vertical in the west half of sec. 8, T.24N., R.82W, and they dip steeply to the southeast at the eastern border of the quadrangle.

In addition to the abandoned mine mentioned in the preceding section, an abandoned underground mine is located in the east half of sec. 8, T.24N., R.82W. Coal was mined for local use from a minor coal lens 30 feet (9 m) below coal bed 116.

Ferris Coal Beds

Coal beds 123, 124, 127-A, and 129 crop out in the Ferris Formation in the southwest part of the quadrangle. In the seven measured sections of Dobbin, Bowen, and Hoots (1929) the thickness of these coal beds ranges from 0.8 to 8.8 feet (0.2 to 2.7 m) and averages 2.9 feet (0.9 m). Dip of the coal beds is southeast at 18° to 22°. Fourteen local coal lenses were mapped in the subsurface from intersections 4 feet (1.2 m) thick or less in drill holes 8, 9, and 10.

It should be noted that the Ferris coal outcrops mapped by Blanchard and Jones (1976) in the Seminoe Dam SE quadrangle and the Ferris coal outcrops mapped by Dobbin, Bowen, and Hoots (1929) in this quadrangle do not correlate across the sheet boundary in the southwest part of this quadrangle.

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 Dobbin, Bowen, and Hoots (1929), an oil well log, 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 Schneider Ridge quadrangle. U.S. Geological survey reviewed these two plates and concluded that no individual coal bed or coal zone on unleased Federal land was thick enough and extensive enough to be selected for coal reserve evaluation. The additional Coal Resource Occurrence maps and the Coal Development Potential maps, which normally accompany this type of report, were not constructed. It is concluded that no currently economic coal resources and coal reserves exist beneath unleased Federal land within the KRCRA in the Schneider Ridge quadrangle.

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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		Average analyses — as-received basis						Calorific Value, Btu/lb	Apparent rank of coal (3)
				Percent						Moist, mineral-matter-free basis (2)	
		Ft	in	Moisture	Ash	Volatile matter	Fixed carbon	Sulfur	Btu/lb		
Published analyses	26	318	6	12.5	7.1	36.2	44.2	0.6	10,553	11,438	sub A <u>or</u> 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 <u>or</u> 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, Schneider Ridge 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
4	11	24N	83W	L	205	0	219	6	14	6	12.40	4.42	35.24	47.94	1.52	11,078
Sample																
22972	11	24N	83W	116	-	-	-	-	5	11	14.1	4.5	32.8	48.6	1.0	10,670

Drill hole data from Rocky Mountain Energy Company (1977).

Sample 22972 data from USBM (1931, p. 42-43 and p. 91).

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