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COAL RESOURCE OCCURRENCE AND COAL DEVELOPMENT POTENTIAL MAPS OF THE SOUTHWEST QUARTER OF THE BRIDGER PASS 15-MINUTE QUADRANGLE, CARBON COUNTY, WYOMING

[Report includes 23 plates]

Prepared for

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

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This report has not been edited
for conformity with U.S. Geological
Survey editorial standards or
stratigraphic nomenclature.

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INTRODUCTION

Purpose

This text is to be used in conjunction with Coal Resource Occurrence (CRO) and Coal Development Potential (CDP) Maps of the southwest quarter of the Bridger Pass 15-minute quadrangle, Carbon County, Wyoming. This report was compiled to support the land planning work of the Bureau of Land Management (BLM) to provide a systematic coal resource inventory of Federal coal lands in Known Recoverable Coal Resource Areas (KRCRA's) in the western United States. This investigation was undertaken by Dames & Moore, Denver, Colorado, at the request of the U.S. Geological Survey under contract number 14-08-0001-17104. The resource information gathered for this report is in response to the Federal Coal Leasing Amendments Act of 1976 (P.L. 94-377). Published and unpublished public information was used as the data base for this study. No new drilling or field mapping was performed, nor was any confidential data used.

Location

In this report, the term "quadrangle" refers only to the southwest quarter of the Bridger Pass 15-minute quadrangle which is located in south-central Wyoming in the west-central portion of Carbon County, approximately 16 miles (26 km) southwest of Rawlins and 25 miles (40 km) southeast of Wamsutter, Wyoming. The area is unpopulated.

Accessibility

Twenty Mile road, connecting the city of Rawlins to the northeast and Wyoming Highway 789 to the southwest, crosses the northwest corner of the quadrangle. The Bridger Pass-Overland Trail road, passing southwesterly across the center of the quadrangle, connects Wyoming Highway 71 (Sage Creek road) to the east and Twenty Mile road to the west. Interstate Highway 80 passes east-west through the city of Rawlins approximately 16 miles (26 km) to the northeast of the quadrangle. The remainder of the quadrangle is served by a network of unimproved dirt roads and trails.

The main east-west line of the Union Pacific Railroad, providing railway service across southern Wyoming, also passes through the city of Rawlins. The railway connects Ogden, Utah to the west, and Omaha, Nebraska to the east.

Physiography

The southwest quarter of the Bridger Pass 15-minute quadrangle is located on the southeastern rim of the Great Divide Basin and on the northwestern edge of the Miller Hill plateau. The landscape within the quadrangle is characterized by a series of northeast-trending ridges or hogbacks and deeply incised valleys. The Atlantic Rim, a prominent northwest-trending ridge 400 to 600 feet (122 to 183 m) high, cuts across the center of the quadrangle. Miller Hill, a portion of the Miller Hill plateau extending into the southeast corner of the quadrangle, is relatively flat.

Altitudes range from approximately 8,480 feet (2,585 m) on the southern flank of Separation Peak in the northeastern corner of the quadrangle to approximately 7,080 feet (2,158 m) along Separation Creek in the northwestern corner of the quadrangle. The Continental Divide crosses the quadrangle, splitting into two branches near Bridger Pass in the center of the quadrangle. The two branches, one to the north and the other to the west, encircle the Great Divide Basin (Welder and McGreevy, 1966).

The Continental Divide separates the drainages in the quadrangle. Separation Creek and its tributaries drain the area northwest of the Atlantic Rim and flow into the closed Great Divide Basin to the northwest of the quadrangle. The eastern portion of the quadrangle is drained by Emigrant Creek, a tributary of the North Platte River to the northeast of the quadrangle. The southern portion of the quadrangle is drained by Eagle Creek and other tributaries of Muddy Creek which flow into the Little Snake River to the southwest of the quadrangle. All the streams in the area are intermittent and flow mainly in response to snowmelt in the spring.

Climate and Vegetation

The climate of south-central Wyoming is semiarid, characterized by low precipitation, rapid evaporation, and large daily temperature variations. Summers are usually dry and mild, and winters are cold. The annual precipitation in the area averages 10.4 inches (26.4 cm). Approxi mately two thirds of the precipitation falls in the spring and summer months during a seven-month period from April through October.

The average annual temperature in the area is 43°F (6°C). The temperature during January averages 21°F (-6°C) and ranges from 12°F (-11°C) to 31°F (-0.6°C). During July the average temperature is 68°F (20° C), and the temperature ranges from 51° F (11° C) to 84° F (29° C) (Wyoming Natural Resources Board, 1966).

Winds are usually from the southwest and the west-southwest with an average wind velocity of 12 miles per hour (19 km per hr) (U.S. Bureau of Land Management, 1978).

Principal types of vegetation in the quadrangle include grasses, sagebrush, greasewood, saltbush, rabbitbrush, and other desert shrubs. Both conifer and deciduous trees grow in sheltered valleys and on higher slopes.

Land Status

The southwest quarter of the Bridger Pass 15-minute quadrangle lies on the eastern edge of the Rawlins Known Recoverable Coal Resource Area. Only the northwest corner of the quadrangle, approximately one quarter of the quadrangle's total area, is within the KRCRA boundary. The Federal government owns the coal rights for a little over one third of this area, as shown on plate 2. No outstanding Federal coal leases, prospecting permits or licenses occur within the KRCRA boundary in this quadrangle.

GENERAL GEOLOGY

Previous Work

Ball (1909) described the coal-bearing Mesaverde Group in his study of the western part of the Little Snake River coal field. Vine and Prichard (1959) briefly described the southeastern portion of the quadrangle in their report on the geology of the Miller Hill area. Berry (1960) made a detailed investigation of the geology and ground-water resources of the Rawlins area, including the eastern two thirds of the quadrangle. Welder and McGreevy (1966) published a report on the geology and ground-water resources of the Great Divide Basin. Gill, Merewether and Cobban (1970) described the stratigraphy of the Upper Cretaceous-age rocks in the quadrangle. Recent unpublished data from the Rocky Mountain Energy Company (RMEC) and from U.S. Geological Survey reconnaissance mapping by Barclay (in press, b) provided coal outcrop and coal thickness information.

Stratigraphy

The formations exposed in the southwest quarter of the Bridger Pass 15-minute quadrangle range in age from Jurassic to Recent. Only the Mesaverde Group of Upper Cretaceous age, which crops out in a wide northeast trending band across the central portion of the quadrangle, contains coal. The Sundance Formation and Morrison Formation of Jurassic age, the Cloverly Formation, Thermopolis Shale and Mowry Shale of Lower Cretaceous age, and the Niobrara Formation of Upper Cretaceous age, which crop out in the drainages cutting Miller Hill in the southeast corner of the quadrangle, are all non-coal-bearing.

The Steele Shale of Upper Cretaceous age crops out in the area between the Atlantic Rim and Miller Hill. It consists of dark-gray marine shale with thin beds of very fine-grained sandstone and siltstone. The Steele Shale becomes more sandy near the top where it is interbedded with gray to gray-green glauconitic sandstone. It reaches a maximum thickness of about 3,800 feet (1,158 m) near the Hatfield Dome, a few miles northeast of the quadrangle (Gill and others, 1970). The Steele Shale is non-coal-bearing.

The Steele Shale is conformably overlain by and laterally intertongues with the Upper Cretaceous-age Mesaverde Group. The Mesaverde Group is subdivided into four units which are, in ascending order, the Haystack Mountains Formation, the Allen Ridge Formation, the Pine Ridge Sandstone and the Almond Formation.

The Haystack Mountains Formation consists primarily of marine and marginal marine shales that are gray to brownish-gray and thick sandstones that weather to a yellowish-gray color. It is subdivided into four members, the basal Deep Creek Sandstone Member, the Espy Tongue Member, the Hatfield Sandstone Member and, at the top, an unnamed member of interbedded sandstones, siltstones and shales (Gill and others, 1970). The Haystack Mountains Formation ranges from approximately 780 to 840 feet (238 to 256 m) thick as indicated in the oil and gas wells drilled in the quadrangle.

The Deep Creek Sandstone Member crops out as the lowest scarp-forming sandstone in the Atlantic Rim (Goett, 1972). The sandy shales of the upper Steele Shale grade upward into the Deep Creek Sandstone which is a pale yellowish-gray, fine- to medium-grained sandstone (Hale, 1961). It averages approximately 80 feet (24.4 m) thick in the oil and gas wells drilled in the quadrangle.

The Espy Tongue Member, a tongue of the Steele Shale included as part of the Haystack Mountains Formation, lies immediately above the Deep Creek Sandstone Member. It is a unit of dark-gray marine shale and lenticular sandstone averaging 225 feet (69 m) thick in the oil and gas wells drilled in the quadangle (Hale, 1961, and Gill and others, 1970).

The Espy Tongue Member grades into the overlying Hatfield Sandstone Member. The Hatfield Sandstone Member is thin-bedded to shaly at the base, and grades upward into a thick-bedded to massive, cliff-forming sandstone at the top (Hale, 1961). It averages approximately 160 feet (49 m) thick where measured in the oil and gas wells drilled in the quadrangle and approximately 250 feet (76 m) thick where it crops out as a massive sandstone scarp near the middle of the Atlantic Rim (Hale, 1961, and Goett, 1972).

Overlying the Hatfield Sandstone Member are approximately 335 feet (102 m) of interbedded sandstones, siltstones, and shales forming the upper unnamed member of the Haystack Mountains Formation.

The marine sandstones of the Haystack Mountains Formation change abruptly to the non-marine carbonaceous shales and fluvial channel sandstones of the Allen Ridge Formation. The Allen Ridge Formation consists mainly of brown and rusty-brown-weathering, thick lenticular sandstone with interbedded siltstone, mudstone, carbonaceous shale, and a few thin coal beds. The coals, commonly associated with the carbonaceous shales, are 1 to 4 feet (0.3 to 1.2 m) thick and are found in the upper portion of the Allen Ridge Formation just below the overlying Pine Ridge Sandstone. A few thin coals may also be present in the lower portion of the Allen Ridge Formation (Barclay and others, 1978).

The Pine Ridge Sandstone is a blanket-like white to light-gray non-marine sandstone unconformably overlying the Allen Ridge Formation. C. S. V. Barclay (written communication, 1979), indicates that the Pine Ridge Sandstone maintains its characteristic blanket-like form as far south as the Browns Hill quadangle. It correlates with the Ericson Formation to the southwest and west.

Conformably overlying the Pine Ridge Sandstone is the Almond Formation of the Mesaverde Group. The Almond Formation, a sequence of marine and non-marine rocks, consists of thick marine sandstone, carbonaceous shale, interbedded clay-shale, mud-shale and sandstone, and coal. The sandstones are pale yellowish-gray to dusky yellow, which weather to various shades of brown, and are very fine grained and thin-bedded.

The Almond Formation shales are of two types. The most typical shale is brownish-gray to brownish-black, carbonaceous to coaly, and contains many ironstone concretions and brackish-water fossils. The second type is a dark-gray to olive-gray shale which contains limestone concretions with marine fossils. The shales are tongues of the overlying Lewis Shale (Gill and others, 1970). Coal occurs in all parts of the Almond Formation, but is thickest and most abundant in the lower 200 feet (61 m) of the formation (Barclay and others, 1978). The combined thickness of the Allen Ridge Formation, Pine Ridge Sandstone, and Almond Formation, as indicated by the oil and gas wells drilled in the adjacent northwest quarter of the Bridger Pass 15-minute quadrangle, is approximately 1,755 feet (535 m).

The Upper Cretaceous-age Lewis Shale conformably overlies the Mesaverde Group. It crops out in the northwestern corner of the quadrangle along Separation Creek. The Lewis Shale is composed of dark-gray to olive-gray fissile shale which grades into a buff-colored sandy shale (Berry, 1960). The middle or upper part of the Lewis Shale often contains a distinctive and widespread unit of interbedded sandstone and sandy shale called the Dad Sandstone Member, a tongue of the overlying Fox Hills Sandstone (Gill and others, 1970). In sec. 7, T. 19 N., R. 89 W., just north of the quadrangle, the Lewis Shale is approximately 2,100 feet (640 m) thick as indicated by surface measurements and core from the El Paso Natural Gas Company WDH-31-1 corehole (Hale, 1961, p. 136). The Lewis Shale contains no coal.

The North Park(?) Formation is a thick sequence of nearly flat-lying Late Tertiary-age strata that unconformably overlie the tilted and truncated beds of the Steele Shale and Niobrara Formation in the southeastern corner of the quadrangle (Vine and Prichard, 1959). The basal conglomerate member, up to 100 feet (30.5 m) thick, consists of a pebble and boulder conglomerate with boulders up to 3 feet (0.9 m) across in a matrix of finer clastic material. The upper member consists of a sequence of fine- to medium-grained sandstone, tuff, and limestone beds.

The basal conglomerate, forming the prominent escarpment of Miller Hill, is capped by a small area of the tuffaceous sandstone and limestone beds of the upper member of the North Park(?) Formation. The North Park(?) Formation is non-coal-bearing.

Recent deposits of alluvium cover the stream valleys of Separation Creek and Eagle Creek, and landslide material covers the slopes of Miller Hill.

Upper Cretaceous-age formations in the Bridger Pass area indicate the transgressions and regressions of a widespread Cretaceous sea. The sedimentary rocks exposed in the quadrangle accumulated near the western edge of the sea and reflect the location of the shoreline.

Deposition of the marine Steele Shale indicates the westward transgression of the sea. The formations in the Mesaverde Group reflect the many fluctuations of the shoreline in a series of marine, shallow-water marine, and non-marine beds deposited on or near the Rawlins delta which extended northeastward into the Cretaceous sea (Weimer, 1961).

The Haystack Mountains Formation of the Mesaverde Group is composed of thick units of marine sandstone (the Deep Creek and Hatfield Sandstone Members) deposited in nearshore and offshore environments as marine beach or barrier bar deposits. These alternate with marine shale (the Espy Tongue Member) deposited in a deeper-water marine environment.

The upper unnamed member of the Haystack Mountains Formation contains open marine shale, marine beach sandstones and lagoonal beds. The lower portion of the Allen Ridge Formation contains predominately non-marine fluvial deposits, while the upper portion contains tidal flat-lagoonal deposits (C. S. V. Barclay, written communication, 1979).

The Pine Ridge Sandstone is a non-marine tongue reflecting the eastward retreat of the shoreline. The lower portion of the Almond Formation of the Mesaverde Group contains sandstone beds deposited in a mainland beach or barrier-bar environment as well as fluvial and coastal swamp sandstones, shales, and coals. The upper portion consists of marine shales, shallow-water marine sandstones, and lagoonal or brackish-water deposits.

Deposition of the marine Lewis Shale marked the continued westward transgression of the Cretaceous Sea. The marine sediments of the Lewis Shale were deposited in water depths ranging from a few tens of feet to several hundred feet.

Structure

The southwest quarter of the Bridger Pass 15-minute quadrangle is located on the southeastern rim of the Great Divide structural basin. Throughout most of the quadrangle, the beds strike northeasterly and dip 10° to 20° to the northwest into the Great Divide Basin.

One normal fault with an apparent displacement of about 250 feet (76 m) has been mapped passing east-west through sec. 18, T. 18 N., R. 89 W., and sec. 13 and 14, T. 18 N., R. 90 W., in the southwestern corner of the quadrangle. A second inferred fault trends northeasterly across secs. 24, 25, and 26, T. 19 N., R. 90 W. (Barclay, in press, b).

COAL GEOLOGY

Four mappable coal beds of the Almond Formation have been identified in this quadrangle. Projections from the available drill hole data indicate that the beds crop out along the dip slope northwest of Jep Canyon. Stratigraphically, the beds are located in the lower part of the Almond Formation. A few, thin Almond Formation coals were found in the upper portion of the formation in a drill hole in sec. 17, T. 19 N., R. 89 W. These coals are believed to be lenticular and of limited areal extent.

The major coal beds of the Almond Formation are not known to have formal names, but have been given informal alpha-numeric names for identification purposes in this report. All of the coal beds dip toward the northwest at approximately 9° to 11°, with the steeper dips occurring in the northern portion of the quadrangle. Two faults have been mapped along the western edge of the quadrangle, as shown on plate 1. Although data is scarce, the faults do not seem to radically offset the coal beds.

Chemical analyses of coal.--No known chemical analyses have been performed on coal from the Almond Formation, but it is believed to be low-sulfur, subbituminous B or C, as are the majority of the coals in the Rawlins area.

Much of the Rocky Mountain Energy Company drill hole data was provided by the U.S. Geological Survey for use in this report. Coal beds 3.5 feet (1.1 m) thick or less were not reported by the Survey, therefore, construction of isopach maps required several thickness estimations using surrounding data.

Z Coal Bed (Split)

The Z coal bed, lowermost of the Almond Formation coal beds usually occurs as two beds separated by approximately 20 feet (6.1 m) of shale and sandstone. The upper and lower splits are labeled Z1 and Z2, respectively. Thicknesses for the Z2 bed range from 2 to 8 feet (0.6 to 2.4 m), generally thinning to the northeast and southwest. The upper split (Z1) averages 6 feet (1.8 m) thick in this quadrangle, thinning to the northeast. Neither split is discernible in the northwest quarter of the Bridger Pass 15-minute quadrangle to the north due to both thinning and lack of complete data. The split line in sec. 14, T. 18 N., R. 90 W., indicates the approximate limit of the split characteristics of the Z coal bed. South of the split line, a single coal bed (the Z coal bed) is 9 feet (2.7 m) thick. Only the unsplit Z coal bed exists to the west in the Fillmore Ranch quadrangle, where it is a maximum of 18 feet (5.5 m) thick.

Y Coal Bed

Fifty to 60 feet (15.2 to 18.3 m) above the upper split of the Z bed lies the Y bed. The maximum drilled-thickness encountered for the Y bed in this quadrangle was 9 feet (2.7 m). However, drilling in the Fillmore Ranch quadrangle to the west indicates a local thickening of up to 15 feet (4.1 m) in sec. 35, T. 19 N., R. 90 W. The bed thins in sec. 36, T. 19 N., R. 90 W., and pinches out toward the northeast, as shown on plate 12. Southwesterly, in the Fillmore Ranch quadrangle, the Y bed is persistant and averages approximately 13.5 feet (4.1 m) in thickness.

X Coal Bed

The X bed is stratigraphically above and separated from the Y bed by 40 to 55 feet (12.2 to 16.8 m) of shale and sandstone. The X bed pinches out toward the northeast but thickens locally to 6 feet (1.8 m) in sec. 11, T. 18 N., R. 90 W. The bed is also approximately 6 feet (1.8 m) thick in the southeastern corner of the Fillmore Ranch quadrangle to the west.

W Coal Bed

The W coal bed overlies and is separated from the X bed by approximately 40 feet (12.2 m) of shale and sandstone. The W bed is a persistant member of the formation but is usually only 4 feet (1.2 m) thick in this quadrangle. Data extrapolated from the Fillmore Ranch quadrangle to the west reveals a local thickening to 6 feet (1.8 m) in sec. 35, T. 19 N., R. 90 W., as shown on plate 20.

COAL RESOURCES

Information from coal test holes drilled by RMEC and the Union Pacific Coal Company, as well as oil and gas well information and surface mapping by Barclay (in press, a and b), were used to construct outcrop, isopach, and structure contour maps of the coal beds in this quadrangle. At the request of RMEC, coal-rock data for some of their drill holes have not been shown on plate 1 or on the derivitive maps. However, data from these holes have been used to construct the derivitive maps. These data may be obtained by contacting RMEC.

Coal resources were calculated using data obtained from the coal isopach maps (plates 4, 8, 12, and 16). The coal bed acreage (measured by planimeter) multiplied by the average isopached thickness of the coal bed and by a conversion factor of 1,770 short tons of coal per acre-foot (13,018 metric tons per hectare-meter) for subbituminous coal yields the coal resources in short tons (metric tons) of coal for each isopached coal bed. Reserve Base and Reserve tonnages for the Z, Z2, Z1, Y, and X beds are shown on plates 7, 11, 15, and 19, and are rounded to the nearest 10,000 short tons (9,072 metric tons). Coal beds thicker than 5 feet (1.5 m) that lie less than 3,000 feet (914 m) below the ground surface are included, although this criteria differs somewhat from that used in calculating Reserve Base and Reserve tonnages as stated in U.S. Geological Survey Bulletin 1450-B, which calls for a maximum depth of 1,000 feet (305 m) for subbituminous coal. Coal Reserve Base tonnages per Federal section are shown on plate 2 and total approximately 21 million short tons (19 million metric tons). Reserve Base tonnages in the various development potential categories for surface and subsurface mining methods are shown in tables 1 and 2. The source of each indexed data point shown on plate 1 is listed in table 3.

Dames & Moore has not made any determination of economic recoverability for any of the coal beds described in this report.

COAL DEVELOPMENT POTENTIAL

Coal development potential areas are drawn to coincide with the boundaries of the smallest legal land subdivisions shown on plate 2. In sections or portions of sections where no land subdivisions have been surveyed by the BLM, approximate 40-acre (16-ha) parcels have been used to show the limits of the high, moderate, or low development potentials. A constraint imposed by the BLM specifies that the highest development potential affecting any portion of a 40-acre (16-ha) lot, tract, or parcel be applied to that entire lot, tract, or parcel. For example, if 5 acres (2 ha) within a parcel meet criteria for a high development potential, 25 acres (10 ha) a moderate development potential, and 10 acres (4 ha) a low development potential, then the entire 40 acres (16 ha) are assigned a high development potential.

Development Potential for Surface Mining Methods

Areas where the coal beds are overlain by 200 feet (61 m) or less of overburden are considered to have potential for surface mining and were assigned a high, moderate, or low development potential based on the mining ratio (cubic yards of overburden per ton of recoverable coal). The formula used to calculate mining ratios is shown below

$$MR = \frac{t_o\ (0.911)}{t_c\ (rf)}$$

where MR = mining ratio
t_o = thickness of overburden
t_c = thickness of coal
rf = recovery factor

Note: To convert mining ratio to cubic meters of overburden per metric ton of recoverable coal, multiply MR by 0.8428.

Areas of high, moderate, and low development potential are defined as areas underlain by coal beds having respective mining ratio values of 0 to 10, 10 to 15, and greater than 15, as shown on plate 6, 10, 14, and 18. These mining ratio values for each development potential category are based on economic and technological criteria and were provided by the U.S. Geological Survey.

High development potential for surface mining exists in 75 percent of that part of sec. 2, T. 18 N., R. 90 W., that lies within the quadrangle and 50 percent of that portion of sec. 12 that falls within the

KRCRA boundary. In sec. 14, high potential exists in 58 percent of that area that lies within the KRCRA and quadrangle boundaries. In T. 18 N., R. 89 W., only the northwestern corner of sec. 6 lies within the KRCRA, all of which is rated high for development potential. In sec. 30, T. 19 N., R. 89 W., high potential covers approximately 87 percent of the section. The remainder of the Federal lands inside the KRCRA boundary have been rated either moderate or low for surface mining development potential, as shown on plate 21.

Development Potential for Subsurface and In-Situ Mining Methods

The coal development potential for subsurface mining is shown on plate 22. Areas of high, moderate, and low development potential are defined as areas underlain by coal beds of Reserve Base thickness at depths ranging from 200 to 1,000 feet (61 to 305 m), 1,000 to 2,000 feet (305 to 610 m), and 2,000 to 3,000 feet (610 to 914 m), respectively.

High development potential for subsurface mining exists in 87 percent of that portion of sec. 2, T. 18 N., R. 90 W., that occurs within the quadrangle boundaries. In T. 19 N., R. 90 W., 62 percent of the area within the quadrangle in sec. 26 has been rated high. Forty-four percent of sec. 30, T. 19 N., R. 89 W., has also been rated high for development potential. The remainder of the Federal lands within the KRCRA are present at depths of less than 3,000 feet (914 m) but coal data is absent or extremely limited.

All Federal lands within the KRCRA in this quadrangle have been rated low for in-situ development potential because of the low Reserve Base tonnages known to be available for in-situ mining.

Table 1. -- Strippable coal Reserve Base data for Federal coal lands (in short tons) in the southwest quarter of the Bridger Pass 15-minute quadrangle, Carbon County, Wyoming

Coal Bed or Zone	High Development Potential	Moderate Development Potential	Low Development Potential	Total
X	630,000	0	0	630,000
Y(A1)	2,120,000	1,220,000	2,840,000	6,180,000
Z1	1,410,000	400,000	3,560,000	5,370,000
Z2	810,000	230,000	880,000	1,920,000
Z	350,000	230,000	130,000	710,000
Total	5,320,000	2,080,000	7,410,000	14,810,000

Note: To convert short tons to metric tons, multiply by 0.9072.

Table 2. -- Coal Reserve Base data for subsurface mining methods for Federal coal lands (in short tons) in the southwest quarter of the Bridger Pass 15-minute quadrangle, Carbon County, Wyoming

Coal Bed or Zone	High Development Potential	Moderate Development Potential	Low Development Potential	Total
X	-	-	-	-
Y(A1)	4,310,000	-	-	4,310,000
Z1	2,360,000	-	-	2,360,000
Z2	80,000	-	-	80,000
Total	6,750,000	-	-	6,750,000

Note: To convert short tons to metric tons, multiply by 0.9072.

Table 3. -- Sources of data used on plate 1

Plate 1 Index Number	Source	Data Base
1	McCulloch Oil of California	Oil/gas well No. 1 State
2	Tenneco Oil Co.	Oil/gas well No. 1 U.P.R.R.-Bolton
3	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 1AS
4	U.S. Geological Survey, 1978, unpublished table	Drill hole RME No. 119
5		Drill hole RME No. 160
6		Drill hole RME No. 118
7		Drill hole RME No. 159
8		Drill hole RME No. 173
9		Drill hole RME No. 157
10		Drill hole RME No. 154
11		Drill hole RME No. 158
12		Drill hole RME No. 172
13	Max Pray	Oil/gas well No. 1 Espy Unit
14	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 1AS

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Table 3. -- Continued

Plate 1 Index Number	Source	Data Base
15	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 2AS
16	↓	Drill hole No. 2AS
17	McCulloch Oil of California	Oil/gas well No. 4 Bence-Federal
18	↓	Oil/gas well No. 1 Bence-Federal
19	↓	Oil/gas well No. 2 Bence-Federal
20	↓	Oil/gas well No. 1 U.P.R.R.-Espy
21	Ladd Petroleum Co.	Oil/gas well No. 9 Espy Unit
22	McCulloch Oil of California	Oil/gas well No. 8 Espy Unit
23	↓	Oil/gas well No. 3 Bence-Federal
24	Sinclair Oil and Gas Co.	Oil/gas well No. 1 Espy Unit
25	McCulloch Oil of California	Oil/gas well No. 2 U.P.R.R.-Espy
26	U.S. Geological Survey, 1978, unpublished table	Drill hole RME No. 175
27	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 1AS
28	Sinclair Oil and Gas Co.	Oil/gas well No. 1 Hansen Ridge Unit

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Table 3. -- Concluded

Plate 1 Index Number	Source	Data Base
29	Sinclair Oil and Gas Co.	Oil/gas well No. 1 Core Hole
30	↓	Oil/gas well No. 2 Hansen Ridge Unit
31	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 2AS
32	U.S. Geological Survey, 1978, unpublished table	Drill hole RME No. 165
33	↓	Drill hole RME No. 117
34	↓	Drill hole RME No. 167
35	Rocky Mountain Energy Co., (no date), unpublished data	Drill hole No. 1AS
36	U.S. Geological Survey, 1978, unpublished table	Drill hole RME No. ARW-1
37	↓	Drill hole RME No. 163
38	McCulloch Oil of California	Oil/gas well No. 1 Powers-Federal
39	U.S. Geological Survey, 1978, unpublished table	Drill hole RME No. 166
40	↓	Drill hole RME No. 162
41	↓	Drill hole RME No. 161
42	Tenneco Oil Co.	Oil/gas well No. 5 Sugar Creek Unit

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